GAS JOURNAL

VOL. 259. No. 4502 101ST YEAR SEPTEMBER 14, 1949

IN IRELAND

WE had the good fortune on Tuesday of last week to participate in the proceedings of the annual meeting of the Irish Gas Association in Dublin, and we have devoted considerable space in the *Journal* to these proceedings. In our issue of Sept. 7 we published the Presidential Address of Mr. T. D. Hamilton and the paper by Mr. T. F. Hastings, of Omagh. A factual report of the business of the meeting, at which Mr. F. K. Thomas, of Limerick, was elected as the new President, will be found on a later page of our issue today, in which will also be found the paper given by Mr. J. W. Young, of Lurgan, which completed the technical fare.

There are many reasons why we look forward with zest to these Irish gatherings. Among the chief is the strong element of friendliness which so strongly and happily pervades these meetings and makes everything so pleasant for the visitors from Britain. And this year, of course, there is also the element of comparison between a gas industry which is nationalised and an industry under private and municipal control. The Irish are excellent hosts and all who attended the meeting would agree with us that much of its success was traceable to the good offices of the Alliance and Dublin Consumers' Gas Company. The meeting place was, in fact, the lecture theatre of the Company. This theatre is most attractive with a backcloth which surely must be unique to the proceedings of a gas conference.

Compared with the June meetings of the Institution of Gas Engineers and the International Gas Union, the meeting of the Irish Gas Association was a simple affair, but within its sphere, all the more useful because of this. It brought attention to bear on the problems of the small works and emphasised the particular difficulties of what is so loosely termed the 'small' man. Equally it threw light on the courage and enterprise of the small man who thinks big—and the Irish are not lacking in either imagination or ingenuity. Mr. Hamilton gained further in the respect in which he is so obviously held by his fellows. The spirit abroad was typified in the paper by Mr. Hastings, who concluded thus: 'Courage and cheerfulness can overcome all difficulties, and with enterprise and initiative in all ranks the smaller works and our industry will go forward to a prosperity greater than in any time past.' Mr. Young's paper was concerned in a most practical way with improvement in plant performance, with major stress on the possibilities of simple and inexpensive control devices.

There is one more thing we would mention before we end this note. The Institution of Gas Engineers was represented at the meeting by Mr. J. H. Dyde, Junior Vice-President, Deputy Chairman of the Eastern Gas Board, who voiced the thoughts of the British gas industry in what must have proved to his hearers not only a charming but also an encouraging vein.

THE GAS INDUSTRY IN EUROPE

ONE of the first points to strike a British reader of the extraordinarily interesting report presented by the Association of Belgian Gas Engineers to the International Gas Union is the unfortunate blanks in some of the columns in the table referring to the gas industry in Great Britain. The missing information is that of the population of the areas served by the industry. 'This notion,' we read, 'is unknown in England and has never been published.' It is admitted that there is some want of precision in the estimates of this figure in the several countries, but in every other of the 15 countries some sort of estimate, usually apparently with some accuracy, was put forward. This is a pity because it is claimed, and with justice, that this figure gives an approximate idea of the proportion of the population of the country which is in a position to avail itself of the advantages of a gas supply, while the quantity of gas sold to this proportion of the population gives possibly a better idea of the state of development of the industry in the country than the quantity sold per capita of the whole population.

Some attempt might be made to fill in this lacuna by quoting from the 1943 Survey, issued by the British Gas Federation of those days but not very widely circulated. But it is difficult to 'marry' these figures with those of the Ministry's Return. In the Survey it would appear that the population served by all gas undertakings in Britain was estimated at 44,221,000. Assuming that the total population was then not very different from that of 1947 given in the I.G.U. report as 49,759,000, we arrive at 89 as the percentage of the population served. This

would fill in one of the blanks in the composite table of p. 75 of our issue of July 6. But when we attempt to fill in figures for annual sales per head of population served we are confronted with the fact that the 1943 Survey is (and perhaps quite rightly) expressed in therms, whereas in the Ministry's Return (upon which the tables of the report are based), while figures are given in both cubic feet and therms this is only so in relation to authorised undertakings, and in any case there is no agreement between the Survey and the Return. For what it is worth, if we take from the Survey the figure of 34.5 therms per head of population served and divide this by the approximate average declared value of 482 B.Th.U./cu.ft. we should arrive at a consumption of 7,150 cu.ft. per head of population served in 1943.

The other conspicuous difficulty which worried our Belgian colleagues (and they have our sympathy as we trust we have theirs) is the chaotic condition of British gas statistics arising out of the existence of non-statutory undertakings. The disappearance of this difficulty with the advent of nationalisation is not, we admit, sufficient justification for so vast a change in the organisation of the industry, but it will be at all events one of the very minor advantages of it. It is to be hoped that there will be other improvements in the statistics of the gas industry when the area boards and the Gas Council get down to their work. There will probably always be different calorific values of gas made and sold in the several areas and perhaps in the several divisions of the areas, though we trust these will not be so absurdly varied with small differences as we have seen so far. But as long as there are differences there is every reason to give at least the total quantities of gas made in both cubic feet and therms. Instead of the 1,000 or so undertakings we shall no doubt have the Return for the several divisions of each area, and we may have a summary Return of the areas in which the estimated population both total and served should be included.

Returning to the table of comparative statistics, it is encouraging indeed to find an advance in every one of the countries covered by this survey, with the possible exception of Germany, where the statistics for 1947 are missing. Even prior to 1937, when they practically cease altogether, the information published in Germany was astonishingly lacking in detail.

The proportion of the total population reached by the gas mains, accepting the figure deduced above, is highest in Britain, '*patrie de Murdoch et de Clegg*,' where we are told that the use of gas has expanded very rapidly and (delicious understatement) the people still remain very gas-minded. Holland is next with 69.80%, followed by Belgium with 60.99, Switzerland with 57.80 (a very creditable figure), Denmark 56.20, and France 51.00. Most of the lower figures are explicable by geographical features. Even in so highly civilised a country as Sweden vast areas are sparsely inhabited, but the number of inhabitants in those areas is relatively large as compared with the population of the south where the principal urban development has taken place, so that no more than 32.35% of the total population lies within the districts supplied with gas.

Among the uses of gas it is noted that there is a fall in public lighting, comparing 1947 with 1937, in every country where the figures are known. Industrial uses, on the other hand, show a marked increase everywhere with Britain in the lead with 30.1% of the total consumption, with the exception of Poland where 41.1% is claimed, no doubt explainable by a lower standard of comfort among domestic consumers. It is interesting to note that the phenomenal increase in total sales in Great Britain, to 138.2% of that in 1938, is approached in all the more highly industrially developed countries and surpassed by some of those industrially more backward. In general the demand has outrun the means of supply; the report gives the somewhat optimistic date of 1950 for production to overtake demand.

Most of the Continental countries have developed 'grid' systems over more or less of the areas served. 'In countries where finance presents no problem' (we wonder which those are!) 'important projects for the extension of the means of production and distribution are in hand to enable gas service to be extended over greater proportions of territory, thus extending the benefits of gaseous fuel to a greater number of the inhabitants and thereby raising the standard of life in the countries in question.'

UNBROKEN ADVANCE

CONCENTRATION of production in big central works, often of the coke oven type, has gone further in certain countries, notably in Belgium, where the isolated gasworks has largely disappeared, Holland and Germany, than in this country, although it is noted that England possessed the biggest single gas undertaking in the world, that of the former Gas Light and Coke Company.

Competition with other forms of energy, particularly electricity, makes itself felt in a very variable manner in different countries. It is indeed very satisfactory that gas makes so good a show in countries like Switzerland and Norway where hydro-electric power generation is so highly developed and in stations not too far from the points of utilisation. At the same time the price of the gaseous calorie in comparison with the calorie obtained from other sources must play an important part in the possibilities, particularly, of the industrial use of gas. 'Other sources' are not always hydro-electric. There is competition with coal gas from natural gas in several countries, some even in France, while residual gases from oil refinery enter the field there and in some other countries, even making a beginning in Britain.

The curve of total sales of gas in 13 countries which we reproduced in our issue of July 6, p. 74, shows in a most convincing fashion the unbroken advance of the contribution of gas to European civilisation in the last 20 years. Three times during this period its growth has been checked. It ceased to rise in the economic crisis of 1931 and did not regain its position until 1934. It fell from 1937 to 1940. The vast output of munitions made it rise abruptly to 1943 when the increasing devastation of the Continent checked it again. Immediately after the conclusion of hostilities it began to rise at a rate more rapid than at any period of the industry's history.

There seems every reason to suppose that the use of gas, which has commended itself to populations so varied

in character as are to be found among this selection of the countries of Europe, must offer conveniences and facilities, economy combined with precision of control, which are likely to ensure its future.

It is abundantly clear that the vastly major proportion of Europe's fuel reserve, and indeed that of most of the world, is still in the form of coal. The processes of gas manufacture and distribution put this fuel at the disposal of the people in the most refined, economical, and convenient form.

MECHANISATION IN THE MINES

POLITICAL and Economic Planning (PEP) has become recognised as a body which issues authoritative factual reports on many facets of national life. It is an independent non-party organisation having its own research and administrative staff and assisted by a large number of outside experts in all branches of industry and political life. Although pledged to shun personal publicity in its statistical tasks, there is no doubt that its reports command, and get, respect. For many years PEP has produced reports on the coal industry, the electricity supply industry, and the gas industry. This month it has added to its list a most important survey in broadsheet form (No. 302) which describes in non-technical language some of the machines now found in the mines and the conditions under which they are used. Salient economic data are also given about their production and about the export trade. The broadsheet would have significance even if it confined itself to these facts alone. But in this instance, and it is not the first, PEP has donned the prophet's mantle for the benefit of the manufacturers of mining machinery, for whom the survey has been principally designed, and has deserted the field of scientific research for the realms of speculation. We will not attempt to place the cart before the horse by presenting its conclusions first; the view of the industry's long-term prospects expressed in the survey with its attendant recommendations has been essentially conditioned by what we consider to be erroneous interpretations of the influence of mechanisation on overall efficiency.

The authors have divided mining machinery into three groups. The first is coal face machinery, employed either in extracting coal from the seam or in introducing it into the transport system of the mine. Underground transport, together with the 'winding' of coal, men, and materials to and from the surface, comprises the second group, and a third prepares the coal for market. The significance of the first two groups is underlined by figures which show that 75% of the total output of the mines in 1947 was cut by machine and mechanically conveyed. This compares with 59% mechanically won and 55% mechanically conveyed in 1938, and validates a remark made in an earlier PEP report ('The British Fuel and Power Industries, 1947') to the effect that 'this represents a greater effort towards increased mechanisation (than pre-war), since the problems confronting the engineer become more difficult as the limit of mechanisation is approached.' But the survey is hag-ridden throughout with the belief that 'natural conditions' in British mines obviate the introduction of mechanisation to anything approaching the extent to which it has been applied both on the Continent and in the U.S.A. Thus, in speaking of 'the revolutionary development' of the Meco-Moore cutter-loader, it both quotes the National Coal Board's opinion that the machine cannot be employed everywhere and emphasises the shortage of trained manpower requisite for its operation. Likewise in discussing improvements in underground transport, it points out the physical difficulties which attend the extension of locomotive hauling—'as with other machinery, established lay-out sets strict limits to the range of practicable reforms.' Surface mechanisation alone, in the opinion of PEP, presents the possibility of radical improvement.

PEP is guilty of serious errors of omission. The difficulties may be conceded (though natural conditions are no easier in the Pas de Calais or in Czechoslovakia, and worse in Belgium). But these difficulties should have been, and still are, a challenge to science. No mention is made in the survey of the fact that prior to nationalisation, according to the Parliamentary and Scientific Committee Report on Coal Uilisation Research, 1943, £200,000 a year was spent by the B.C.U.R.A. on research schemes for the mining industry; nor is mention made of the scientific service which has been built up for the industry in recent years by the N.C.B. and is currently engaged in the improvement of coal quality and the survey of the country's coal resources. More important, in estimating the future of mechanisation, the existence of a national plan of capital development is entirely ignored. In 1948, according to the annual report of the N.C.B., £24 mill. was spent on capital development, including the construction of new collieries and the large-scale reconstruction of existing mines. In the words of the annual report, 'in some coalfields output can be increased and costs can be considerably reduced. . . . . In some coalfields there are a number of inefficient mines running at high costs. Some of these can be greatly improved by concentrating the output at fewer and wider shafts, or by introducing new machines or methods of haulage.'

It is not surprising, therefore, to find that PEP, far from attempting a forward looking policy for both mechanisation and the industry as a whole, arrives at half-hearted conclusions which leave an air of gloom. It recognises that output per manshift is now equal to that of 1938, but says that 'with more machines a *higher* output might be expected.' There follows this remarkable piece of logic: 'If, despite increased mechanisation, productivity refuses to rise above the pre-war level, may not a reduction in the rate of investment in machinery be advisable?' We should prefer to say that pre-war productivity has been attained precisely because of increased mechanisation. Failure to reach an even higher level has been due to a variety of reasons, unmentioned in the survey, including an increased average age of those employed underground, an inheritance of old uneconomic pits and machinery, and an initial shortage of faceworkers.

The gas industry has watched with apprehension the price of gas-making coals climb steadily higher; it awaits, and has a right to expect, a return to a more moderate level in the near future. It would be a sorry day if either the gas industry or the National Coal Board came to accept the pessimism which pervades this latest PEP report.

AMMONIA AS FERTILISER DIRECT

In the July *Chimie et Industrie* there is an interesting and well illustrated article on the use of anhydrous ammonia fed direct to the soil as a fertiliser. Ammonia is injected into the soil at a pressure about 50 lb./sq. in. through tubes placed behind the tines of a harrow. The harrow is drawn by a tractor upon which is mounted a tank containing 227 litres, equivalent to about 2 cwt. of nitrogen. In the tests at Douvrin 102 kg. of nitrogen was fed per hectare (say 1 cwt. per acre). The depth of the points of injection is about 15 cm., and this is varied (by adjusting the level of the tines) according to the crop and the humidity of the soil. When correctly adjusted there is practically no loss of nitrogen, no smell of ammonia being perceptible behind the harrow. The speed of nitrification is closely related to the acidity of the soil, being the slower as the acidity is greater. When the pH is below 5.5 ammonia may be injected in the autumn because, nitrification being practically *nil* during the winter, the ammonia remains in that form until the spring. On the other hand, if pH is greater than 6 nitrification in the winter is not negligible and there is risk of nitrates being washed away by the rains; in that case, therefore, the operation is carried out in the spring. Results show that the increase of weight of crops is considerably greater when anhydrous ammonia is thus used than when ammonium nitrate is used. The high concentration of nitrogen, 82.3%, in anhydrous ammonia as compared with the usual salts permits a considerable reduction in the cost of transport and spreading. There appear to be great possibilities in this new method of applying nitrogenous fertiliser in large scale agriculture.

NATIONALISATION AND THE T.U.C.

The report on the administration of the nationalised industries, issued by the General Council of the Trades Union Congress and summarised in the *Journal* of August 31, held promise of a fiery debate at the Bridlington Congress last week. In the event, the debate was conducted with an air of unreality. Mr. Attlee's call for loyalty and responsibility brought an immediate response, and delegates, instead of pressing many of the more controversial matters to a vote, agreed to leave them in the hands of the General Council. This was the fate of a resolution calling for the restoration of the right to strike, and the miners agreed to remit to the Council their proposal for a joint council representative of the governing bodies of nationalised industries and the unions concerned. The only fire in the debates came from a resolution by the bank employees which urged that the boards of nationalised industries should include a member of the union of the industry concerned, with particular reference to the Bank of England. Piquancy was added to this discussion by the fact that there is now a vacancy in the Court of the Bank of England caused by the death of Sir George Chester. In opposing the resolution the General Council spokesman said that the bank employees were asking for something which no other union had claimed; they were, in fact, asking that the Bank of England should be a closed shop. The policy of Congress in the selection of workers' representatives on the boards of nationalised industries was that the choice should not be limited, but should be open to all with a wide experience and knowledge of working class organisation. The depth of feeling within the trade unions on this question of administration was shown when voting by hand seemed to indicate that the resolution was carried. A demand for a card vote resulted, however, in a defeat of the motion by 3,566,000 to 2,761,000 votes. This majority of some 800,000 was the smallest of any card vote taken at the Congress.

Research into problems of lubrication and machining is to start within the next few months at the laboratories of the Mechanical Engineering Research Station (D.S.I.R.) at Thorntonhall, near the new town of East Kilbride. The department's stand at the Scottish Industries Exhibition included a model of the proposed Research Station.

Letter to the Editor

NATIONALISATION AND GAS PRICES

DEAR SIR,—May I venture once more to comment upon topical affairs. You referred in your issue of Aug. 31 to the heavy increases in prices of gas in various areas and you seemed to suggest there was ample justification for such increases in the fact (the 'all important' fact you called it) that Boards are under statutory obligation to be 'self-supporting.'

Sir, your leader writer is a master of understatement! What he should have said was that whereas previously under statutory control gas undertakings could only make a profit by giving efficient service to the customer under the stringent price-control stipulated by Parliament, now there is no price-control the workers in the Industry are to be given protected employment and the profit of the area boards is no longer dependent upon anything else than the price they can arbitrarily impose upon the consumer.

A Government which relies for its support upon its crusade against the profit motive now eliminates from the gas industry the justification of profits—*i.e.*, efficient service to the public—and substitutes therefor a system whereby profit is guaranteed regardless of efficient service by the simple process of charging the consumer or customer what you please. Surely by now it ought to be realised that in a nationalised industry the customer —*i.e.*, the Public—will always be put second. Under free enterprise everyone, including the wage-earners of industry, knew consciously or subconsciously that his livelihood depended on being able to sell the product in a free market where people were free to choose competitive services. Though most people naturally desired to be paid for their services as highly as possible, it was tacitly understood that the cost of the product could not be carried too high because then the commodity would not sell so freely and unemployment would result. But under nationalisation all that goes by the board. The ceiling is taken off and everyone is out for all he can get because the industry belongs to the State and the customer will just have to take what he is given and like it.

Yours faithfully,
HYDE C. BURTON.

5, Great Winchester Street,
Old Broad Street, London, E.C.2.
Sept. 2, 1949.

Personal

Mr. **Fitzherbert Wright** has joined the Board of Directors of Sigmund Pumps, Ltd.

◇ ◇ ◇

Mr. **R. V. Steed,** who has been Managing Director of Dougall's Gas Meters, Ltd., for 19 years, has resigned his position on account of ill health. Mr. **D. V. Steed** has been appointed a Director in his place.

◇ ◇ ◇

Mr. **Norman Taylor,** for some time Personnel Manager to Marshall Sons and Co. (Successors), Ltd., engineers, Gainsborough, has been appointed Personnel and Establishment Officer to the West Midlands Gas Board.

◇ ◇ ◇

Mr. **S. H. Wood** has been appointed a Group Sales Manager of the National Benzole Co., Ltd., and Mr. **W. L. Roney,** his deputy, succeeds him as Manager of the London Division. The two Assistant London Divisional Managers will be Messrs. **H. G. Cook** and **C. E. Wilson,** former London area representatives.

◇ ◇ ◇

Mr **J. R. Martindale,** Engineer in Charge, Neepsend works of the Sheffield Division of the East Midlands Gas Board, has been appointed Deputy Engineer to the Edinburgh Group, Scottish Gas Board. Mr. Martindale, after early training with the architectural and engineering firm of George Adlam and Sons, Ltd., Bristol, held several appointments with the former Bristol Gas Company. Before going to Sheffield, Mr. Martindale was Chief Engineer and Assistant General Manager to the East Hull Gas Company.

Mr. **John T. Saddington** has been appointed a Director of Thos. W. Ward (Coal) Longbottom, Ltd., Sheffield, following his promotion two years ago as a local Director. Mr. Saddington has been with the Company since he was 13 years of age and during his 33 years of service has had extensive experience in every department. Of recent years his major interest has been in the supply of fuels for industrial usage.

◇ ◇ ◇

Mr. **F. Humphery-Smith,** Secretary and Accountant to the Burgess Hill and St. John's Common undertaking of the South Eastern Gas Board, completed 25 years of service with the undertaking on August 31. The occasion was marked by a presentation on behalf of the staff and employees. Mr. Humphery-Smith has played a large part in local affairs, and is the founder-Secretary of the recently formed Rotary Club at Burgess Hill.

◇ ◇ ◇

Mr. **John King,** aged 76, has had a lifetime's experience in the vitreous enamelling industry. In 1892 he was appointed by W. & A. C. Russell & Co., of Scotia Foundry, Pendleton, Salford, later Fletcher Russell & Co., Ltd., to inaugurate an enamelling department. Having successfully accomplished this, he was approached by Richmonds Gas Stove and Meter Co., Ltd., of Warrington, in 1902 to install and manage one for them, where in 1912 he was joined by his son, and with the exception of service by his son in the Royal Flying Corps during the first world war, the partnership has not been severed. In 1918, the Kings decided to go into business on their own account in Chesterfield, and from that day to the present time, their firm, John King & Son (Enamellers), Ltd., have built up a business with quality and service their primary objects.

◇ ◇ ◇

Mr. **G. E. Jeffs** has been appointed Northern Manager for Ascot Gas Water Heaters, Ltd., and will be responsible for the sales organisation covering the areas of the North Eastern, North Western, Northern and Scottish Gas Boards. As distinct from the sales of Ascot gas water heaters, Mr. Jeffs will also be responsible for the distribution of Compoflex gas tubing and FA/Neat portable gas appliances, and for promoting the sales of all gas appliances manufactured by Radiant Heating, Ltd. He is well known in Scotland, having spent some time there as Scottish Manager prior to his appointment as Manchester Branch Manager in January, 1945. Mr. **F. Johnson,** until now Manager for Scotland, has been promoted to a higher appointment at the Head Office of Parnall (Yate), Ltd., the parent company of Ascot.

◇ ◇ ◇

Mr and Mrs. **C. H. Chester** were the recipients on September 4 of two cast silver candlesticks made by Thomas Hemming, of London, in 1765, and an antique French Empire mantel clock. The presentation, from the Chairman and Directors of the former Swindon United Gas Company, took place during the tea interval of a cricket match between the South Western Gas Board Headquarters Staff and a representative team of the Swindon Sub-Division. The guests were welcomed by Mr. W. B. Claridge, Manager of the Swindon Sub-Division, who expressed pleasure at the presence of former directors of the Swindon United Gas Company in Messrs. T. Medcalf, Chairman, E. W. Beard, and H. V. Slade. In making the presentation, Mr. Medcalf remarked that he had been intimately connected with Mr. Chester during the 16 years he had occupied the post of Director and General Manager of the Swindon United Gas Company. Mr. Medcalf said that he and his co-directors regretted the severance of the partnership caused by the nationalisation of the gas industry, but were very proud that Mr. Chester had been selected to occupy the post of Chairman of the South Western Gas Board. Although their business association had terminated, the friendship which had grown up over 16 years would remain. Mr. Chester, in expressing his thanks, reviewed his past association with the Swindon and associated gas undertakings prior to nationalisation.

Diary

Sept. 15.—**North British Association :** Annual General Meeting, Music Hall, George Street, Edinburgh.

Sept. 24.—**Eastern Junior Gas Association :** Meeting at Norwich. Presidential Address by J. T. Brookes.

Sept. 28-29.—**Wales and Monmouthshire Association of Gas Engineers and Managers:** Annual Meeting, Cardiff. (Golf competition at Radyr Golf Club on Sept. 28 ; annual meeting at Engineers' Institute, Park Place, Cardiff, on Sept. 29, followed by visit to steel works of Guest Keen and Baldwins).

Sept. 29.—**Midland Association of Gas Engineers and Managers :** Visit to the works of the Midland Tar Distilleries. Ltd., Oldbury.

Sept. 30.—**Manchester Distrcit Association of Gas Engineers.** Visit to works of R. & J. Dempster, Ltd.

Sept. 30.—**Scottish Junior Gas Association (Western District),** Glasgow. Presidential Address of R. F. Bell.

Oct. 7-9.—**Association of British Chemical Manufacturers :** Chemical Works Safety Conference, Scarborough.

Oct. 11.—**Midland Junior Gas Association,** Birmingham. Presidential Address of S. C. Bentley.

Oct. 19.—**Society of British Gas Industries Golf Circle :** Autumn Meeting, Fulwell Golf Club, Hampton Hill, Middlesex.

Oct. 25.—**Institute of Welding :** Presidential Address of O. V. S. Bulleid, C.B.E., M.I.MECH.E. Institution of Structural Engineers, 11, Upper Belgrave Street, London, S.W.1.

An extraordinary general meeting of Glover and Main, Ltd., will be held on October 5 to increase the capital to £750,000 by the creation of 250,000 £1 Ordinary shares and to consider the capital bonus. The bonus is one Ordinary share for every ten held on October 5 and will absorb 45,000 of the new shares. It is also proposed to revise the memorandum and alter the articles.

A new space plan for the Industrial Finishes Exhibition to be held at Earls Court in August, 1950, has now been prepared, and will be in the hands of the exhibitors and potential exhibitors very shortly. Nearly all the exhibitors who had space for 1949 have taken space in the 1950 show. Many exhibitors who were unable to take space in the 1949 show because of the time factor have indicated their willingness to participate in the 1950 exhibition. Arrangements are being made in great detail for the Exhibition and for the Scientific Congress on industrial finishing processes which will be held simultaneously with the Exhibition.

Steel production in August reached a new record for the month, the annual rate being 14,953,000 tons, compared with 14,117,000 tons last year. Pig iron production was at an annual rate of 9,477,000 tons, compared with 9,048,000 tons in August, 1948. Last year's figures have been exceeded in every month so far this year. The weekly average rate of steel production in August this year was 287,600 tons, compared with 271,500 tons a year ago. The weekly figure for pig iron was 182,300 tons, compared with 174,000 tons a year ago. In July, a month, like August, affected by holidays, the annual rate of steel production was 12,697,000 tons. The July, 1948, figure was 12,084,000 tons.

A first allocation of 825 houses has been made to Midlothian County authorities for the proposed new town in the Newbattle area. Agreement has been reached between the County and the National Coal Board on the area to be set aside for housing and other building. The plan permits the proposed town to occupy an area of approximately 1,545 acres, embracing Newtongrange and Easthouses. The first 825 houses are to be built by the Scottish Special Housing Association out of the 1950-51 programme for miners and represents an important practical step in the contemplated industrialisation of Midlothian.

The new town's proposed population of 30,000 will have planned housing estates and acres of open countryside. There will be a town centre with shops, cinemas, and other amenities, and probably at least one industrial estate on the southern fringe and possibly another elsewhere. A green belt will separate the town from the developing communities at Dalkeith and Eskbank.

Irish Gas Association

THE annual meeting of the Irish Gas Association was held in the lecture theatre of the Alliance and Dublin Consumers' Gas Company on Sept. 6, under the Presidency of Mr. T. D. Hamilton, of Belfast. Those attending were welcomed to Dublin by the Lord Mayor, Dr. Cormac Breathnach, T.D., and also by the Chairman of the Company, The Rt. Hon. James MacMahon, P.C.

The President then gave his address (published in the *Journal* last week) and was presented with the President's Medal by Mr. P. J. Sheehan (Cork), immediate Past President.

The report of the Committee was given by Mr. W. Cole, Hon. Secretary and Treasurer, who also submitted the abstract of accounts and the auditor's report, mentioning that during the year 16 new members had been elected and that the balance in hand was £230. He emphasised that the standing of the Association was now stronger than ever.

Thanks to Mr. Cole were expressed by the President, who said how pleased they were that Mr. Cole had consented to carry on with the work for a further session.

There followed the report of the scrutineers on the election of Committee and Officers. It was announced that Mr. F. K. Thomas (Limerick) had been elected President and that Mr. W. P. Lonergan (Galway) and Mr. G. W. Walmesley (Londonderry) had been elected to the Committee. Mr. Walmesley is District Representative to the Council of the Institution of Gas Engineers.

Technical fare at the meeting was provided by Mr. J. W. Young (Lurgan), who gave a paper bearing the title 'One Thing Leads to Another' (see p. 655), and Mr. T. F. Hastings (Omagh) who spoke on 'Matters of Interest to the Smaller Gasworks.' Mr. Hastings' paper was published in the *Journal* last week.

Members were guests of the Dublin Gas Company at an informal lunch in the Company's showrooms.

The annual dinner took place at the Royal Hibernian Hotel, Mr. Hamilton being in the chair. There was a lengthy toast list. The toast of 'Ireland' having been honoured at the call of the President, Mr. F. K. Thomas submitted 'The Minister for Industry and Commerce,' Mr. Daniel Morrisey responding. Alderman F. Logan, Deputy Mayor of Bangor, gave 'The City of Dublin,' to which Major J. Anderson replied. Then came 'The Irish Gas Industry,' proposed by Mr. J. H. Dyde, Junior Vice-President of the Institution of Gas Engineers, Mr. N. J. Robertson, General Manager of the Dublin Gas Company, responding. The toast of 'The Guests' was proposed by Mr. H. W. Saville, Managing Director and Secretary of the Wexford Gas Consumers' Company, Ltd., and was responded to by Mr. H. E. Bennet, M.C., Director, Alder and MacKay, Ltd. 'Kindred Associations' was given by Mr. G. Walmesley and replied to by Professor M. Logan, President of the Institution of Civil Engineers (Ireland). The final toast, that of 'The Press,' was proposed by Mr. L. W. Dalby, Manager, Waterford Gas Company, to which Mr. C. Harler, *Gas World*, replied.

Editorial comment on the meeting is made on p. 637.

Progress in Ireland

An analysis of gas undertakings in the 26 counties of Ireland, which now constitute the Republic, for the years 1946 and 1947 is published in the current issue of 'The Irish Trade Journal and Statistical Bulletin,' which is issued by the Central Statistics Office of the Republic. This states that in 1946 the total output of the industry expressed in terms of manufactures and work done was £2,089,205 and in 1947 was £2,141,045. Of this, 18,926,894 therms of coal gas and water gas had a net selling value of £1,459,135 in 1946, and 21,497,726 therms had a net selling value of £1,669,154 in 1947. Fittings and repairs in 1946 were valued at £9,141 and in 1947 at £9,809. The cost of materials used in 1946 was £185,107 and in 1947 was £1,385,690.

The average number of employees in the industry in 1946 was 1,643, and in 1947 was 1,668. Their average weekly earnings were: 1946, males (under 18 years of age), £1 4s. 3d.; (18 years and over), £4 18s.; females (18 years and over), £1 17s. 5d.; 1947, males (under 18 years of age), £1 4s. 8d.; (18 years and over), £5 17s. 11d.; females (18 years and over), £2 1s. 1d. These figures relate to 28 undertakings.

'The Irish Trade Journal and Statistical Bulletin' also records preliminary figures of the Census of Industrial Production for 1945 and 1946. These show that the net output per person engaged in the industry in 1945 was £384 and in 1946 was £409. The total capital invested in the industry at the end of 1945 was £5,798,121 and at the end of 1946 was £5,841,599.

No Coal for Limerick

As a result of a complete breakdown of negotiations with the Hired Carters' Society for the use of a lorry to transport coal from Limerick docks to the gasworks, the City Manager has decided that it is not possible to bring any more coal to Limerick unless the gasworks is accorded the same rights regarding the use of its own transport as other coal importers.

Since Limerick Corporation resumed direct importation of coal some two years ago, extreme difficulty has been experienced in carrying out the efficient discharge of coal cargoes. This is due in no small measure to the fact that in most instances it was not possible to procure a sufficient number of horse-drawn vehicles to keep up a continuous flow from the ships.

In the early part of 1948 the discharge of coal became so slow that difficulty was experienced in inducing ship owners to send their ships to Limerick port because the delays occasioned usually upset the ship's timetable, and even though demurrage was paid by the Corporation, there was a considerable loss accruing to the shipowners.

Trade Statistics

The Trade Statistics for July, 1949, just issued by the Central Statistics Office in the Republic of Ireland show imports of 25,647 tons of gas coal, valued at £117,819, as against 29,593 tons, valued at £134,383, in July, 1948. This brings the total of these imports for the first seven months of 1949 to 133,816 tons, valued at £605,634, compared with 165,954 tons, valued at £728,017, for the corresponding period of 1948.

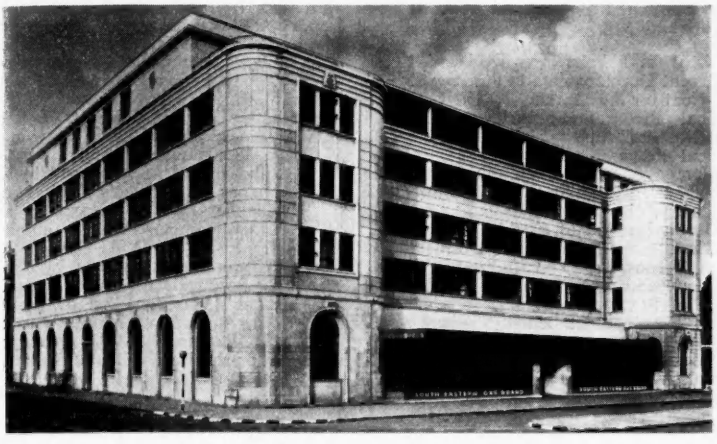
The South Eastern Gas Board has announced that from Sept. 19 the headquarters of the Consultative Council appointed for the Board's area will be at 4/6, Wandsworth Road, South Lambeth, S.W.8 (Tel.: Reliance 1691).

Radiation, Ltd., have recently fitted 108 panel-type gas fires in bedrooms of the Queen's Hotel, Eastbourne, which is centrally situated on the sea-front with central heating, private telephones and bathrooms. These fires, which are silent in operation, were specially chosen by the hotel management, and were installed by the Eastbourne undertaking of the South Eastern Gas Board.

With an Increase in coal production of 434,700 tons on the previous week's total of 3,766,600 tons, output for the week ended Sept. 3 was 4,201,300 tons. This also represents an increase of 138,500 tons on production over the corresponding period of 1948. Tonnage lost due to stoppages, holidays, &c., amounted to 46,800 tons, approximately one-tenth of the tonnage lost in the previous week. Manpower, however, continues to decline with a total loss of 1,000 workers for the week ended Aug. 27 over the previous week. Of this number, 700 were face workers. Gas production for the week ended Sept. 2 shows an increase of 114 mill. cu.ft., while an increase in electricity supplies of 16 mill. units is shown for the same period.

The Head of the Department of Applied Chemistry at the Northampton Polytechnic, St. John Street, London, E.C.1, Dr. J. E. Garside, has given particulars of two special courses of lectures which have been organised for the forthcoming session. The first is a series of 20 lectures on recent trends in fuel technology. Four lectures are to be given by Mr. G. F. G. Murray on recent developments in furnace and boiler design, and Mr. R. F. Hayman will give two lectures on radiant heating by town gas for industrial processing. A lecture by Dr. S. R. Craxford on the Fischer-Tropsch process will also be given. The fee for the course which commences on Oct. 4 is 30s. The other course of lectures, by Mr. L. R. Barrett, will commence on Oct. 5, and will deal with the subject of ceramics, their production, testing and utilisation. The course will consist of 12 lectures and the fee is 21s. Admission to either course is by personal enrolment (10 a.m. to 7 p.m.) or by post.

S.E. Headquarters



The South Eastern Gas Board has now moved to new headquarters, shown above, in Katharine Street, Croydon (Tel.: Croydon 4466), the chief offices of the former Croydon Gas Company, which were completed in October, 1941. There are five floors and a basement; the ground floor will continue to be the Croydon undertaking's main showroom, the remaining four floors being used for offices. In addition to headquarters officials, the officers of the Board's East Surrey Division and the officers of the Croydon undertaking will work from Katharine Street.

At the Request of the Gas Council, the Institution of Gas Engineers has taken over the Science Museum Gas Gallery Committee of the former British Gas Council and will supervise the completion of the scheme for a permanent gas exhibit at South Kensington, in collaboration with the Museum authorities.

Proposals to Convert gas lit houses in Hawick to electricity have been deferred pending a full survey of costs. At present there are some 408 houses in three main schemes where gas is used for domestic lighting as well as for cooking. Cost of conversion would vary from £20 to £30, according to the type of house and the whole conversion would cost approximately £9,000.

At the First Meeting of the Scottish Gas Consultative Council, held in Edinburgh on Aug. 30, Sir Andrew Clow, Chairman of the Scottish Gas Board, said that one of the main factors which were contributing towards the necessity of the Board's considering a revision of gas prices was the change in costs—for example, in the price of coal. Others included fresh liabilities such as contributions to the guarantee fund under the Act, increased capital charges, and the delayed period during which the income of a number of undertakings had not been equal to expenditure. The meeting of the Consultative Council, which was recently appointed by the Ministry of Fuel under the Gas Act, 1948, had been arranged as soon as the constitution had been made known, said the Chairman, Mr. A. T. Morrison (Aberdeen), to enable members to meet one another at the earliest opportunity. He reviewed the scope and the obligations imposed on the Council under the Act.

The St. Helens Undertaking of the North Western Gas Board reports that gas has been installed for cooking and washing by free choice of the tenants in every house of the new 152-house Park Street estate now completed by the Haydock U.D.C. This achievement was due to the willing co-operation of the Haydock Housing Department, who gave the gas undertaking the names and addresses of the prospective tenants. These were then individually visited and 'sold' by the undertaking's District Salesman, Mr. A. Scott. Installation of the appliances was completed in every case by the day the tenants took up residence.

Dundee Corporation has received authority from the Scottish Gas Board to repay over £4,000 held as security deposits against non-payment of gas accounts. A letter from the Board suggested that the deposits should be repaid with interest to Aug. 31, and left the details to be arranged by the Corporation. At a Finance Committee meeting on Aug. 25, Mr. W. Hughes asked if at the same time people who had stood guarantor for the payment of gas bills were to be relieved of that responsibility. The Town Clerk said that this had not been stated by the Gas Board. The City Chamberlain said it would be difficult to repay some of the £4,000; some of the deposits were very old, and they came across addresses of houses which had been demolished. It was agreed to take up with the Board the question of relieving guarantors of their responsibility.

Two Courses of Lectures on domestic and industrial fuel will be given at the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, E.C.3, commencing Oct. 18 and 19 respectively. They have been arranged in conjunction with the Coal Industry Society for those who are engaged in the sale and distribution of coal, and will be followed by a third year tutorial course as a preparation for the examination in solid fuels of the City and Guilds of London Institute and the Institute of Fuel. The first year course is divided into eight subjects, occupying 17 lectures, which include combustion, carbonisation and gasification, domestic appliances, industrial appliances, and storage, stocking and handling of coal. The second year course also comprises eight subjects, to be given in 19 lectures, and includes swelling and coking properties, combustion in practice, and furnaces. The fee for each course is 25s., and application for enrolment should be made to the Principal of the Institute prior to the opening date.

Gas in the Fight for Health

All central heating and cooking services in the West Lane Hospital, Middlesbrough, are gas-fired. The kitchen (shown above) caters for 300 to 350 patients and staff. Total annual gas consumption in the hospital is 28 mill. cu. ft., excluding that which is used in the laundry.

Institute of Fuel

THE Journal of the Institute of Fuel published in its August number the subjects to be discussed in its various Sections during the coming session as far as these have been determined. In London the season opens with a repeat of the excellent paper by Forth and Jackson, on the 'Trend of Power Station Design,' read before the N.E. Section in March. Confined to coal-fired steam-driven plant, it presents a very complete picture of the present possibilities of the modern power station with a brief account of its historical development. The estimated present-day cost of production in a modern station using steam at 600 lb./sq. in. and 800° F. is stated to be 0.5811d. per unit sent out. Of this cost 46.4% is due to the purchase and handling of coal and 47.25% represents capital charges. The approximate capital cost of such a station, based on 60 MW generators, would be £50 per kW. installed, of which 41.42% is due to boilers, coal, and ash-handling plant (without buildings), while 14.68% represents the turbo-generators and auxiliaries. In the future organisation of the industry the authors suggest there should be three types of power station, Class A operating continuously at their designed load, Class B designed to give continuous operation with varying load and suitable for shutting down at week-ends, Class C suitable for intermittent operation. It is suggested that the relative capacities of the three classes would be: A 15%, B 65%, and C 20%, and it is anticipated that their thermal efficiencies at their designed loads would be 35.3%, 30.70%, and 28.33% respectively.

Allied to this subject the programmes contain several papers relating to boilers and the use of steam: Ridings on 'Considerations Affecting the Choice and Design of Boiler Plant' and Goldstern on the 'Practical Value of Steam Storage' (N.W. Section), Guy on the design of 'Automatic Stokers for Shell Type Boilers' (S. Wales and Scotland), Booley on the 'Performance and Efficiency of a Pulverised-fuel fired Boiler Plant over 20 Years' (N.E.), and 'Fuel Problems in Marine Propulsion,' by Captain W. Gregson, at Glasgow. B.C.U.R.A. is presenting a paper in London and to the Midland Section on 'Down-jet Combustion.' 'Domestic Heating' is to be discussed with the ladies in the Midlands and in the North-East (J. S. Hales), and 'District Heating in the New Towns' (Margolis) is to be discussed in London.

Papers on furnaces and industrial heatings include Thring on 'High Temperature Furnaces' (London), Howell on 'Industrial Gas in the Manchester District' (N.W.), Gray on 'Fuel Control in the Open Hearth Furnace' (S. Wales), Sarjant on 'Heat Transmission in Relation to Furnace Control' (N.E.), Wattleworth and Sanderson on the 'Use of Coke in the Blast Furnace' (also N.E.), Farmer on the 'Science and Application of Thermal Drying' (Yorks), and Gray on the 'Measurement of Re-heating Furnace Performance' (also Yorks), Mason and Clegg on 'Heat Balances in Practice' (Mid.), 'Baulk on 'Instruments and Techniques in Industrial Heat Transmission' (Yorks), while Maxwell is to discuss 'Thermal Efficiency in Industry by Combined Power and Heating' in Scotland.

Coal and coke are represented by 'Recent Developments in the Preparation of Coal for the Market,' by Hirst (N.W.), 'Coal Preparation: Achievements and Possibilities,' by Needham (Yorks), 'Coal Preparation,' by Grounds (Mid.), 'Storage of Solid Fuel,' by Pinckheard (London), 'Scientific Control in the Coal Industry,' by Hicks (also in London), 'Devolatilisation of Coal,' by Trotter (S. Wales), 'Coke Production: Present Status and Trends,' by Townend (also in S. Wales), and 'The Winning and Utilisation of Peat' by a nominee of the Irish Turf Development Board (Scotland).

More miscellaneous subjects are a joint discussion on the 'Dry Cooling of Coke,' with the Iron and Steel Institute in London, Buckingham on the 'Heat Pump' (N.W.), 'A History of Fuel Technology,' by Cummings, at Chester, 'Coke Oven Reconstruction Problems in South Wales in Relation to Continuity of Gas Supplies,' by Drake (S. Wales), 'Fuels for Gas Turbines,' by Williams (also in S. Wales), a discussion in Sheffield on 'Men, Money, and Fuels,' to be opened by Dr. Fells, a paper on 'Britain's Fuel Policy,' by Sir Claude Gibb, in Newcastle, and 'Recent Developments in High-Temperature Refractories,' by Dodd (Yorks). Oil seems to be represented only by 'New Plants for Producing Chemicals from Oil in England' (London—author to be announced) and Morton on 'Current Trends in Refining' (Mid.). The programme for the East Midland Section is not yet announced.

TRADE NEWS

The use of a special grade of Delaron laminated plastic, manufactured by the Plastics Division of **Thomas De La Rue & Co., Ltd.,** for refrigerators and other food containers was the subject of a trade note in the *Journal* of Aug. 24. The sheet sizes were given in error as 9 in. by 4 in.; they should have read 9 ft. by 4 ft.

We have received additional information concerning the kitchen installation at the London County Council's civic restaurant at Drayton Park, Islington, an illustration of which was published on p. 476 of the *Journal* of Aug. 24. The equipment shown, comprising boiling pans, food steamers and frying range, was supplied by **Rowe, Bros. & Co., Ltd.,** Liverpool, and manufactured by the **Hygienic Stove Co., Ltd.,** Huddersfield.

A 'Chaseside' mechanical shovel has recently made a 4,500 mile journey across Canada, from Toronto to Vancouver, in a successful attempt to break down sales resistance in the west to the long-established Canadian habit of buying this type of equipment from the U.S.A. The trip was originated by Mr. G. H. Jackson, Director and General Manager of the **Chaseside Engineering Co., Ltd.,** when he felt the need for selling to the dollar countries. Adopting this unorthodox method of sales approach, he acquired a flat bed trailer and truck trailer on hire purchase terms in Canada, and accompanied by a technical assistant, set out on a circuitous tour of Canadian cities in July. The mechanical shovel has been demonstrated to trade and to municipal and provincial officials of highways and works departments in an endeavour to prove, as Mr. Jackson has said, that 'the best way to sell a Canadian user is to demonstrate how it works right in his local territory.' A number of orders for the machine, 5,000 of which are at present in use in 40 different countries, have been placed, and agency appointments in various provinces and major cities have also been arranged.

Lest our reference in last week's *Journal* should have given the impression that **Hewittic Rectifiers** are limited in capacity to 800 kW, we are asked to state that they can be supplied in any capacity ranging from a few kilowatts upwards.

Details of an aluminium alloy 'positive-grip-pattern' treadplate, are given by the **British Aluminium Co., Ltd.,** of Salisbury House, London Wall, London, E.C.2, in a recently published brochure. The pattern, which is several times deeper than any similar chequer plating, gives the raised treads a clearance of .090 in. from the base and contains no interstices to trap oil, water or any other liquid, thereby obviating the usual difficulty of slippery surfaces. Light weight and attractive appearance combined make 'P-G-P' plating available in all branches of industry. Non-sparking, the treadplate may also be used in combustible atmospheres.

We have received a brochure on oil purification from **Sharples Centrifuges, Ltd.,** of 'Tower House,' Woodchester, Stroud, Glos., giving a lucid description of the Sharples Super-Centrifuge. Designed for creating and applying centrifugal force to a fluid, the Sharples oil purifier utilises a hollow cylindrical rotor capable of generating a separating and clarifying force of 13,200 times the force of gravity. Detailed drawings emphasise the simplicity of the machine and substantiate claims of easy maintenance and quick changing of wearing parts within approximately 15 min. Services are also available for the replacement by a temporary bowl (as the rotor is commonly called) should it prove necessary to return a bowl for overhaul to one of the Sharples factories, and trained engineers are available at branches throughout the country in cases of emergency. Capable of purifying oils ranging from heavy diesel fuel oils to gear case lubricating oils, the Sharples machine incorporates low maintenance costs with greater efficiency and long working life.

Company Results

Thomas De La Rue, Ltd.

The consolidated trading profit for the year ended April 2, after deducting all expenses for manufacture and administration, including debenture interest, and providing for depreciation, is £881,992. Provision of £566,341 for taxation, payment of preference dividend and ordinary dividend at 50%, and transfer of £148,192 to capital reserve, leaves a balance of £30,509, from which is deducted a net profit of £2,468 attributable to minority interests in subsidiaries. With £313,958 brought in from the previous year from the parent company, and £11,774 from subsidiaries, there is a balance of £353,773 to be carried forward.

The accounts of the parent company show a trading profit of £826,030, after charging debenture interest, directors' emoluments, depreciation, expenditure on foreign factories in respect of war damage, war damage contributions and insurance, bank interest, and provision for liabilities. Net profit is brought up to £859,568 by the addition of net income from sub-let properties, interest and dividends, interest on war damage claims, dividend from subsidiary, and debt provision not required. After providing £552,500 for taxation, payment of £127,325 for Ordinary dividend at 50% and £9,625 for preference dividend, there is a balance of £342,224 to be carried forward, against £313,958 brought in from the previous year.

Current assets as shown in the consolidated balance-sheet are £2,771,465, including stock and work to the value of £1,708,296. The reduction of current liabilities and provisions to the approximate value of £2 mill., including a bank loan of £360,000, leaves £700,783 in surplus current assets. Capital reserves are shown as £905,014, and revenue reserves and surplus as £1,181,263.

In their report circulated with the accounts, the directors refer to the liquidation of the wholly-owned operating subsidiaries and the transfer of the assets to the Company in accordance with the Board's centralisation policy. The directors state that in reviewing the book values of these assets, they considered it wise to follow a conservative policy and to eliminate such items as goodwill, pre-production expenses and others of a similar nature. They have also considered it a desirable precaution in the prevailing circumstances to write off entirely the balances of items of land and buildings in the Rangoon and Shanghai factories. The directors add that satisfactory results were again shown by the security printing and stationery divisions. Although market conditions deteriorated in the latter part of the financial year, there has since been an improvement in the operations of the plastic division, formerly known as De La Rue Insulation.

In the Potterton Gas division the maintenance of the heavy purchase tax on gas water-heating appliances has again seriously restricted the sale of these articles. In consequence a great degree of attention was paid to the manufacture and sale of gas cookers, the sale of which has considerably expanded.

United Gas Industries, Ltd.

The accounts for the year ended Mar. 31 show a consolidated profit of £514,864, a decrease of £31,173 over the previous year. There is added a sum of £2,500 for credits relating to previous years, against £21,083, and interest totalling £4,072, against £2,621, making a total of £521,436, compared with £569,741 for the previous year. Aggregate net profit of £196,183, against £192,984, was arrived at after deduction of directors' fees, £5,000 (same), and other emoluments, £22,400 (same), depreciation, £56,534, against £49,565, stock reserve nil, against £25,000, group pension scheme £12,476, against £7,699, audit fees, £1,050 (same), and taxation £227,793, against £266,043. Profits retained by subsidaries totalled £31,529, compared with £28,345, leaving the net profit of the parent company £164,654, against £164,639. Ordinary dividend for the year is repeated at 17% (interim 5% and final 12%), absorbing £63,799, and that on the Deferred is again 1s. 9d. per share, taking £26,273. General reserve allocation is £50,000 (same), and the carry-forward of the parent company is raised by £3,438 to £35,982, and that of the subsidiaries by £31,529 to £408,297.

George Kent, Ltd.

The holding company's accounts show a trading profit for the year ended Mar. 31 of £381,290, compared with £176,768 in 1948, and a profit after tax of £119,842. The deduction of £3,410 to debenture redemption fund, and the payment of preference dividends and an Ordinary dividend of 10%, the same as for last year, leaves a sum of £145,697 to be carried forward, against £54,194 brought in from the previous year. The consolidated balance sheet shows current assets to the value of £1,529,223 and liabilities of £485,353. In his review with the accounts, the Chairman, Mr. P. W. Kent, says the large increase in profit is due to the expansion of turnover, which increased to the record total of £2½ mill., combined with a very marked rise in productivity per manhour. 'The trading situation is becoming more difficult,' Mr. Kent says, 'and the tendency must be for a reduction in price; and, at the same time, in two of the three main divisions of our products, industrial instruments and steering gears for vehicles, there is still a pressure upon us, from customers' requirements, to increase our capacity, and that will involve some capital expenditure. In the third main section, mechanical meters, the order position is more difficult. The great bulk are small domestic water meters, 95% for export; and here we face growing competition in all our markets.

THE SILENT SERVICE

Below: s.s. St. Julien enters Weymouth Harbour. Left: The ship's galley.

Catering to meet the needs of the many thousands of passengers who travel on British Railways' ships to the Channel Islands is no easy task in the confined space between ship's decks. The *St. Julien*, one of the ships which ply between Weymouth and Guernsey, has recently been equipped with two of the latest modern solid fuel cookers—the Eagle Advance No. 1 and the No. 31. The larger stove, the No. 1, as shown above, is in the ship's galley, but is also used at the height of the season as an auxiliary to the main galley for cooking meals for the passengers. The Advance No. 31, installed in the bosun's galley, provides cooked meals or keeps food warm for seamen on watch.

GLASGOW: FINAL REPORT

THE 80th annual report and accounts of the former Glasgow Gas Department, issued by the Glasgow Division, Scottish Gas Board, cover a period of 11 months only—from June 1, 1948, to April 30 this year—as compared with 12 months for the previous year. The report shows a gross revenue for the period of £3,350,802, compared with £3,549,765 for the previous year, and a gross expenditure of £3,334,498 against £3,340,807, leaving a credit balance to be carried to profit and loss account of £16,304, against £208,958. Interest and sinking fund charges absorbed £78,233, against £156,416, leaving a deficit on the 11 months' working of £61,929, compared with a surplus in 1947-48 of £52,542. A surplus of £36,148 brought forward from the previous year reduced the deficit to £25,781.

Gas delivered and accounted for during the period amounted to 11,444,081,421 cu.ft., as compared with 12,674,245,147 cu.ft. for the preceding year. Unaccounted-for gas increased from 5.1% to 9.73%. The maximum day's send-out was 47,310,000 cu.ft., and the highest daily make was 46,810,000 cu.ft. Coke oven gas purchased during the period was 2,582,632,000 cu.ft. after purification, and the quantity of water gas made was 1,450,433,000 cu.ft.

The quantity of coal carbonised amounted to 551,295 tons, against 565,245 for the previous year, and the average cost was 54s. 10.176d. per ton, or 2s. 8.392d. more than in 1947-48. Coal gas made per ton of coal carbonised was 15,679 cu.ft., which, with water gas, gave an average of 18,310 cu.ft., as compared with 15,991 cu.ft. and 18,778 cu.ft. respectively per ton for the previous year.

The total quantity of coke and breeze sold during the period was 212,279 tons, compared with 223,874 tons for the previous year, and the average price received per ton was 53s. 0.428d., against 49s. 11.531d.

Sales from the chemical works have proved more difficult with the arrival of a buyers' market, but the sales figure shows an increase of £11,353 over the corresponding 11 months of 1947-48. The early months of 1949 showed a diminution in the increased demand for road tar which was experienced in 1948.

The work of laying mains and services to new housing and industrial estates was maintained throughout the period, and improved supplies were also effected to several areas following the relay of mains to larger diameter. A new 18 in. high pressure main was completed to supplement the supply to the King's Park area with good results. Mains now represent a total of 1,601 miles. Improved supplies of materials from contractors, particularly piping and fittings, considerably eased the difficulties in fulfilling orders for cooking appliances, and a marked increase in output of these and other appliances was recorded. An increased demand for piping and meters for housing development was also satisfied.

The demand for cookery demonstrations, a large number of which were given, is increasing, and fruit bottling demonstrations, held in the Central and Queen's Park showrooms, had good results. In particular, the Modern Homes Exhibition at Kelvin Hall was most successful, the sales orders exceeding all previous records. The Industrial Heating Section is fully engaged; industrialists are becoming increasingly interested and many applications were received for conversions to town gas or for new supplies.

The number of gas meters in use at April 30 was 347,152, an increase of 1,704 on the previous year. Ordinary type meters showed an increase of 106 and prepayment meters an increase of 1,538. Appliances on hire and free loan comprised: Cookers and range fittings, 185,172; grills, 13,584; boiling burners, 31,259; gas fires on hire, 6,159; radiators on hire, 3,422; water heating appliances on hire, 518—a total of 240,114 compared with 245,738 for the preceding year.

Cork Gas Consumers' Company has declared and made payable on Aug. 26 an interim dividend of 3% on Ordinary shares for the year ending Dec. 31, 1949.

William Coward and Co., Ltd., have received a cablegram from the Metropolitan Gas Company of Melbourne reporting a net profit for the year ended June 30, of £76,894. A dividend of 5s. per share in Australian currency is being paid. The amount carried forward is £30,696.

The Directors of Alliance and Dublin Consumers' Gas Company have recommended a dividend of 3% actual for the half-year ended June 30, 1949, against 2½% for each of the preceding half-years. Net profit for the period was £34,752, compared with £30,588 for the previous six months, and £32,986 for the June, 1948, half-year. During the six months ended June 30 last, the price of gas was reduced by 3d. per therm, and the total price reduction in 1948-1949 was 6d. per therm.

The Telephone Number of the headquarters of the Institute of Fuel (18, Devonshire Street, Portland Place, London, W.1), is now Langham 7124/5/6.

A New £50,000 Vertical Retort House capable of producing 650,000 cu.ft. of gas per day from its eight retorts was recently put into operation at Spalding gasworks. The scheme, the first major improvement at the works for 20 years, was completed in 15 months by the Woodall-Duckham Co., Ltd.

Peterborough Chamber of Trade has asked the Chairman of the Gas Consultative Council of the Eastern Gas Board to hold an immediate inquiry into the question of the future cost of gas in the city. The request follows protests at the nationalised service's 3d. per therm immediate increase in the rates to the general public and the proposed increase in rates for central heating and baking. The Chamber is taking action on behalf of Peterborough consumers in the belief that the Gas Consultative Council was not consulted about the proposed new central heating charges.

New Publications

The Institution of Gas Engineers has published three grey editions, available from the Institution's headquarters, 1, Grosvenor Place, London, S.W.1, price 2s. 6d. each, post free. These are 'The Catalytic Removal of Organic Sulphur Compounds from Coal Gas,' by Messrs. J. H. G. Plant, B.SC., A.M.I.CHEM.E., and W. B. S. Newling, M.A. (No. 344/157), 'A Survey of the Uses of Gas for Domestic and Industrial Purposes, together with Factors Influencing Future Trends,' by Mr. Stirling Everard, M.B.E. (No. 338/152), and 'A Survey of Gas Distribution Practice,' by Mr. H. J. Escreet, B.SC.(ENG.), M.I.C.E., M.INST.GAS E. (No. 337/151).

An account of the year's progress by the Joint Fire Research Organisation is given in 'Fire Research, 1948,' published for the Department of Scientific and Industrial Research by H.M.S.O., price 1s., or 1s. 2d. by post. It includes a statistical survey of fires in post-war dwellings, and special attention has been devoted to new forms of building construction that have been developed since the war. Experimental studies have been made of new types of flue construction and of pre-stressed concrete, and considerable progress has been made towards the establishment of a standard test for combustible roofing materials. Preliminary experiments are reported in the use of wetting agents for fire fighting; these indicate the range of special applications in which they are of value, but they do not appear to offer any spectacular advantage in general fire fighting.

The British Standards Institution has issued a Packaging Code (B.S. 1133) for industry. This is a revised and extended version of the war-time code of packaging which was provided for the Ministry of Production by the B.S.I. as a guide to Service and Government Departments, and their packaging contractors, in selecting and determining the right type of packaging for any product, the right materials to use, and the method of construction. The need to prevent avoidable losses in the export field through deterioration or damage in transit has resulted in this new code, which has been prepared under the supervision of the B.S.I. Packaging Standards Committee, representative of 24 trade and scientific bodies, eight Government Departments, large trading concerns, and individual packers. A glossary of packaging terms is also in preparation. Copies of the introductory and other sections of the Code may be obtained from the British Standards Institution, Sales Department, 24/28, Victoria Street, London, S.W.1.

A Special Street Lighting Sub-Committee has recommended that the lighting of main roads within the Bradford area should be on a pre-war level during the winter months, and that arrangements should be made as early as possible for the lighting on other roads and streets to be improved so far as labour and materials will permit. They have also asked that lighting on selected streets should be operated during the early morning from November to February.

Carbonising Test Figures

CORRECTION TO A BASIS OF STANDARD INERTS IN GAS

By GAS CHEMIST

THE amount of inert constituents drawn into the gas steam in the course of carbonisation, or which may enter the gas after leaving the retorts (as in the case of air accidentally introduced on the inlet side of the exhauster or deliberately added to assist oxide revivification or for any other purpose) will not, in itself, have any effect on the thermal yield from the coal, but, in cases where one is working to produce gas of a definite calorific value, the attainment of the required C.V. may be brought about in one or both of two ways—*viz.*, the dilution of a richer gas with inerts or its dilution with combustible gases (*e.g.*, hydrogen and carbon monoxide) of lower calorific values. The latter is the normal procedure in steamed vertical retorts, and the remarks given below relate particularly to such practice.

Effect of Steaming

Suppose the amount of inerts in gas, per ton of coal, produced by carbonising coal A in a given plant is greater than the amount obtained in the same plant when carbonising coal B, and suppose that the C.V. of the gas is required to be the same in both cases. Under these conditions, if the coals are being compared, an unfair advantage will be given to coal B, since it will have been possible to steam such a coal to a greater extent than would be possible with coal A—*i.e.*, a higher proportion of gas derived from the coke could be added, thereby giving a higher therms-per-ton figure at the given C.V. Any attempt to steam to the same extent with coal A would result in lowering the C.V. below the agreed figure, and would therefore be inadmissible. The above case relates to comparisons of coals *in the same plant*, or to pairs of tests which do not involve deliberate variation of inerts. In cases where *different installations* are under comparison, with the same coal in use, a different state of affairs may exist, since the admission of inerts may have, of necessity, to be different in each case by reason of differences in the state of repair of retorts or from other causes inherent in the plant. In such a case, no correction for inerts is permissible, since the difference in inerts is a characteristic of the plant, and a statement of such difference is an essential item of information regarding plant performance.

Where tests are made on the same plant, however, corrected figures for gas volume and calorific value should be calculated, not as an end in themselves so much as a means for further calculations in which potential yields of gas *of the same C.V.* may be determined by making allowances for the amount of blue water gas which can be added or which needs subtracting to bring the results to gas of the required calorific value.

Although adjustments made on inerts alone will not affect the therms-per-ton figure, they will alter the component factors making up the product—*i.e.*, the gas volume per ton and the C.V. will both be altered—but only in such manner that their product will remain constant at the same therms-per-ton figure as before the correction. The therms, may, however, be, figuratively speaking, at a higher or lower 'potential' (*i.e.*, at a higher or lower C.V.), since the higher the calorific value the greater will be the amount of blue water gas (C.V. = 300) which can be added to a given volume of gas to bring down the C.V. to a given figure.

As an example, suppose a coal in test A yields 17,000 cu.ft. per ton, of gas, of 460 C.V. containing 10% inerts ($CO_2 + O_2 + N_2$). It is required to adjust these figures so as to be comparable on an equal inerts basis with the results of another test B in which the gas contains 12% of inerts.

Test A Therms per ton $= \frac{17{,}000 \times 460}{100{,}000} = 78.2$

Volume of inert-free gas per ton = 17,000 − 10% = 15,300 cu.ft. This volume is (100 − 12)% = 88% of the volume which the gas would occupy if it contained 12% inerts. Its volume would therefore be, with 12% inerts,

$\frac{15{,}300 \times 100}{88} = 17{,}386$ cu.ft., and its C.V. would be

$\frac{7{,}820{,}000}{17{,}386} = 450.$

The test figures are therefore adjusted from 17,000 cu.ft. at 460 C.V. to 17,386 cu.ft. at 450 C.V. These latter figures would therefore be the ones taken in making any subsequent allowances for blue water gas dilution to a given C.V.

Adventitious Inerts

It may be remarked in passing that, although it has in the past been customary to connect to a given *percentage* of inerts, this seems to be not quite the logically correct procedure, since the amount of adventitiously introduced inerts does not necessarily bear any relation to the gas yield per ton, and therefore has no direct connection with the *percentage* so indrawn. Differences in the amounts of such inerts in comparable tests are generally due to differences in pull conditions and other local circumstances beyond the control of the operator. It is suggested, therefore, that corrections should be made on a basis of a standard *volume* of inerts per ton, rather than on a percentage figure. A little consideration will lead to the conclusion that accurate allowances for inerts in gas cannot be made on a simple basis. For instance, the inclusion of CO_2 as an inert constituent introduces difficult points. A high or low CO_2 figure may have but little connection with adventitiously introduced inerts, since it may be the result of differences inherent in the straight carbonising and steaming reactions. For instance, certain coals yield more or less CO_2 on straight carbonisation. Temperature conditions affect the CO_2 content; steaming efficiencies, resulting in the production of more or less CO_2 in the blue water-gas, and other factors, may be inherent in particular cases. Some of the CO_2 may be adventitious, but part is undoubtedly a direct product of gas making. Some investigators, while agreeing that the inclusion of all the CO_2 for the purpose of such calculations is questionable, prefer to ignore it altogether, and calculate on a basis of oxygen and nitrogen only, reducing cases to a definite percentage of $O_2 + N_2$, the same percentage in each case (or, perhaps more correctly, the same volume per ton of coal or per hour in each case).

Consider, also, the question of nitrogen in the gas. Here again we have an example of an inert constituent which is not entirely adventitious, since all coals yield small quantities of nitrogen on straight carbonisation, due mainly to the decomposition of ammonia, and, while dependent to some extent on the particular coal, the temperature of carbonisation and the degree of steaming, is not widely different in different cases.

We may therefore divide the inerts in gas into two broad classes, which may be termed respectively adventitious (*i.e.*, accidental), and inherent, (*i.e.*, produced from straight carbonising and steaming reactions).

In the first class are placed:—

(1) Combustion or flue products entering through cracks

and pores in the retort walls. These are nitrogen and carbon dioxide.

(2) CO_2 and nitrogen derived from the reactions of air indrawn through the hot charge—*e.g.*, entering through leaks in the *bottom* ironwork of the retort.

(3) Air entering through leaks in the *top* ironwork and mains under 'pull' from the exhauster.

(4) Air deliberately added, either before or after the exhauster for the purpose of assisting oxide revivification.

In the second class are placed:—

(5) CO_2 from straight carbonising and steaming reactions.

(6) Nitrogen from coal, liberated in carbonising reactions, &c.

It is suggested that adjustments to test results on a basis of differences in inerts in the gas should only be made in respect of *adventitious* inerts—*i.e.*, classes (1) to (4) above.

The amounts of inerts for which allowance must be made are, therefore:—

(a) All the oxygen

(b) Part of the nitrogen

(c) Part of the CO_2.

Dissections under headings (b) and (c) above may be made as follows: Adventitious nitrogen is all derived from flue products and from air. That which is derived from the combustion flues will be accompanied by CO_2, and, for the purpose of calculating the amount of this CO_2, it will be necessary to know how much of the nitrogen has been derived from flue products.

Carbon dioxide and nitrogen derived from air entering at the bottom of the retorts are, for this purpose, classed as flue products. All the free oxygen in the gas has come from air introduced into the system outside the retorts, and has therefore been accompanied by 3.8 times its volume of nitrogen. The total adventitious nitrogen may be taken to be equal to the total nitrogen, minus a constant figure of 120 cu.ft. per ton of coal, the latter representing the nitrogen evolved from the coal itself. If we subtract from this total adventitious nitrogen, an amount equal to 3.8 times the oxygen figure, we shall obtain, approximately, the amount of nitrogen demand from the flues. This is sufficiently accurate for our purpose, although not strictly accurate in all cases, since a small portion of such nitrogen will have come from the oxide purifiers in those cases where oxygen has been absorbed in the process of revivification. The subsequent errors so introduced, however, are not serious in normal cases.

Having obtained a reasonably accurate figure for the 'flue' nitrogen, factors may be calculated to determine how much CO_2 has been drawn into the gas by retort leakage. If required, similar factors can also be calculated for determining the volumes of carbon monoxide and hydrogen which accompany this CO_2, and for the thermal value of these combustibles as adventitious additions to the gas therms.

These factors may be taken at the following average values, and are figures by which the quantity of 'flue' nitrogen must be multiplied in order to give the volumes of the constituents under consideration:

For CO_2 F = 0.18

„ CO F = 0.28

„ H_2 F = 0.11

„ Therms per ton, F = 0.0013 per cu.ft. 'flue' nitrogen.

The derivation of the above factors is based on the following calculations and assumptions. Take the extreme cases between which any case may lie. These will be:—

(a) When all the indrawn gas is producer gas

(b) When all the indrawn gas consists of completely oxidised products of combustion.

For these two extremes, the following compositions may be taken as typical. (Any variations in final figures due to variations likely to be encountered will be negligible.)

Case (*a*) $CO_2 + CO + H_2 + N_2$
$5\% + 30\% + 12\% + 53\%$

Case (*b*) $CO_2 + N_2$
$21\% + 79\%$

(Case (b) also applies where air has entered the retort in such a position that it becomes converted completely into CO_2 and nitrogen in its passage through the charge).

In case (a) therefore, each volume of nitrogen is accompanied by 5/53 volume of CO_2
30/53 „ „ CO
12/53 „ „ H_2

Similarly in Case (b), each volume of nitrogen is accompanied by 21/79 volume of CO_2

A third case is possible, in which complete combustion of producer gas has taken place and all the CO_2 thus formed has afterwards been reduced to CO by passing through the hot carbon in the retort, thus:

$$\left.\begin{array}{l} 21CO_2 + 79N_2 \\ 21C \end{array}\right\} \quad \overline{42CO + 79N_2}$$

i.e., 1 volume of nitrogen is accompanied by $\frac{42}{79}$ parts of CO.

Since this case yields a gas mixture intermediate between cases (a) and (b) it is not here taken into further consideration.

Extreme cases may therefore be summarised as follows: The mean values being taken in practice. By taking mean values, maximum errors of the order of ± 5 B.Th.U. in the C.V. of the gas, or ± 0.5 therms per ton in the yields may be introduced in ordinary cases of normal yields.

TABLE I.

Factors to be applied to 'Flue' Nitrogen volumes to calculate volumes of accompanying CO_2, CO, and H_2 (cu.ft. per ton of coal).

	Case (*a*).	*Case* (*b*).	*Average.*
For CO_2	0.0943	0.2660	0.1802
„ CO	0.5660	nil	0.2830
„ H_2	0.2264	nil	0.1132
„ Total CO_2+CO +H_2	0.8867	0.2660	0.5764
Therms per ton adjustment per cu. ft. 'Flue' Nitrogen ...	0.00254	nil	0.00127

The following table may then be constructed to show the distribution of inerts in the gas.

TABLE II.

Distribution of inerts in gas from carbonising tests. (Cu.ft. per ton of coal.)

	Total	Inherent.	Adventitious.	
			Total.	Flue Products.
O_2	a	none	a	none.
N_2	b	120	b—120	b—120—3.8a = c.
CO_2	c	d—e	c×0.18 = e	c×0.18 = e

It will be seen, therefore, that, if the total separate amounts of oxygen and nitrogen in the gas are specified, it will be possible to calculate the separate quantities of adventitious oxygen, nitrogen, and carbon dioxide (also, incidentally, of adventitiously introduced H_2 and CO).

In order, therefore, to correct for standard amounts of adventitious inerts, it will be necessary to decide on definite standards for cu.ft. of oxygen and nitrogen in the gas. These standards are arbitrary and may or may not be taken as the same figures obtained in one of the tests, in which case, time and trouble is saved, since only one test of a pair will need adjustments.

Where, however, tests are required to be comparable with

results based on previously specified standards, it may be necessary to correct both tests to this standard.

The following example will illustrate the method of applying adjustments for the effects of adventitious inerts in the case of a typical comparison. This supposes two tests, using different coals, carbonised in the same installation, under conditions which were originally intended to be the same in both cases, but which, in actual fact, were somewhat different.

The carbonisation was carried out in continuous vertical retorts.

	Coal 'A.'		Coal 'B.'	
Cu. ft. gas per ton of coal ...	18,000		17,500	
C.V. of gas	460		470	
Therms gas per ton	82.82		82.24	
Gas Analysis	%	Cu. ft. (ton).	%	Cu ft. (ton).
CO_2	4.5	810	3.9	683
C_nH_m	1.6	288	1.6	280
O_2	0.4	72	0.3	52
Co	17.5	3,150	20.0	3,500
H_2	51.0	9,180	50.0	8,752
CH_4	19.0	3,420	21.2	3,710
N_2	6.0	1,080	3.0	523

Let us take as our standard of comparison, a gas containing 1,000 cu.ft. of total nitrogen and 50 cu.ft. of oxygen per ton of coal This corresponds to 1,054 cu.ft. of adventitious inerts, calculated as below, using Table II.

	Adventitious Inerts, &c. Total.	Flue Products.
O_2	50	*nil*
N_2	880	690
CO_2	124	124
Total A.I.	1,054	
H_2	76	76
CO	193	193
Total A.I., $=H_2=CO$ ...	1,323	
Therms/ton of $H_2=CO$ ...		0.88

The first step in calculating the 'corrections' is to reduce the gas volumes originally obtained to the volumes which would have been obtained if there were no adventitious inerts, and if no hydrogen or carbon monoxide had entered the gas from the combustion flues.

To these amended figures must then be added the 1,054 cu.ft. of adventitious inerts taken as the standard, plus the quantities of hydrogen (76 cu.ft.) and carbon monoxide (193 cu.ft.) accompanying these inerts. The result will be a new set of figures representing the 'corrected' results, in which alterations will have been made to some or all of the following items:—

(a) Gas volumes.

(b) Therms of gas per ton.

(c) Calorific value of gas.

Calculations from the examples are as follows:— (See Tables I and II.)

Adventitious Inerts, &c.	Coal A. Total.	Coal A. Flue Products.	Coal B. Total.	Coal B. Flue Products.
O_2	72	nil	52	nil
N_2	960	686	403	205
CO	123	123	37	37
Total A.I.	1,155		492	
H_2	75	75	23	23
CO	192	192	57	57
Total A.I. $+H_2+CO$	1,422		572	
Therms/ton H_2+CO		0.87		0.26

Corrected figures are therefore:—

	Coal A.	Coal B.
Cu. ft. gas per ton ...	18,000 − 1,422 + 1,323 = 17,901	17,500 − 572 + 1,323 = 18,251.
Therms gas per ton...	82.82 − 0.87 + 0.88 = 82.83.	82.24 − 0.26 + 0.88 = 82.86.
C.O. of gas	$\frac{82.83 \times 100{,}000}{17{,}901}$ = 463	$\frac{82.86 \times 100{,}000}{18{,}251}$ = 454

Gas Analysis.	%	Cu. ft./ton.	%	Cu. ft./ton.
CO_2 ...	4.5	810 − 123 + 124 = 811	4.2	683 − 37 + 124 = 770
C_nH_m ...	1.6	288	1.5	280
O_2	0.3	72 − 72 + 50 = 50	0.3	52 − 52 + 50 = 50
CO	17.6	3,150 − 192 + 193 = 3,151	19.9	3,500 − 57 + 193 = 3,636
H_2	51.3	9,180 − 75 + 76 = 9,181	48.3	8,752 − 23 + 76 = 8,805
CH_4 ...	19.1	3,420	20.3	3,710
N_2	5.6	1,080 − 960 + 880 = 1,000	5.5	523 − 403 + 880 = 1,000

Summarising the main effects of the corrections, we therefore have:—

	Uncorrected Results.		Corrected Results.	
	Coal 'A.'	Coal 'B.'	Coal 'A.'	Coal 'B.'
Cu. ft./ton	18,000	17,500	17,901	18,251
C.O.	460	470	463	454
Therms/ton	82.82	82.24	82.83	82.86

[In last week's article by Gas Chemist, lines 5 and 6 should have read: '(1) The proportions of the major constituents CO_2, CO, H_2 and N_2 in gas.' The symbol 'H_2' was omitted.]

PROPANE FOR MEETING PEAK LOADS

IN a paper to the National Gas Department of the American Gas Association, Mr. A. B. Lauderbaugh, chief gas engineer of the Manufacturers Light and Heat Company, Pittsburgh, discussed liquified petroleum gas as a standby fuel, or to meet winter time peak loads, which, he pointed out, is no longer in the experimental stage. The general physical properties of propane are known and it is accepted as a fact that propane-air can be made interchangeable with either natural or manufactured gas.

Almost without exception, the author continued, the gas companies of the Appalachian area, or, for that matter, of the entire country, have within the last four years come face to face with an unprecedented winter peak load problem. Much of this problem is undoubtedly due to the fact that because the rate structures of gas companies are subject to regulation, they have not advanced with the prices of competitive fuels; consequently gas is sometimes a cheaper fuel than oil, anthracite coal, or even bituminous coal. The net result is that the gas companies have a much greater winter domestic load than ever before, and system load factors have declined. Winter loads have always varied with the weather, but never before were the variations so severe. In the Appalachian area, depletion of local fields further complicates the problem by requiring that more and more gas be obtained through long-distance pipelines.

Entirely separate from the physical problem of meeting this peak load with pipeline gas is the economic side of the consideration. Most pipeline gas is now sold at a demand commodity rate. Such rates put a severe economic penalty on purchases at even 75% load factor, and are prohibitive at the load factors now developed by the domestic heating load.

The delivery into a system of bulk volumes of gas for winter use is not the only factor in solving this peak load problem. In the past, many natural gas companies have had a few communities with a high saturation of gas heating, but never before have so many communities wanted so much gas for house heating. The problem has become one of placement as well as procurement. Distribution systems, intermediate pressure systems, and the interconnecting transmission networks are, in many cases, extended to their limit of capacity.

Just how much of the peak load of any company can be furnished by propane-air will be a function of the physical structure of the property, the individual load characteristics of the company, and the purchase and sales rates for gas. During normal winter in the Appalachian area there will be an average of 15 days when the total domestic demand for gas will be within 10% of the demand on the maximum

day. It is on these 10 to 20 days that peak shaving with propane-air can be used to best advantage. It is a generally accepted opinion that most natural gas companies cannot afford to make more than 2% of their total annual sales in propane-air gas. There are, of course, notable exceptions to this general statement and every contemplated installation must be given individual consideration; but for most companies, 2% will still be the top limiting figure.

Since propane-air is expensive and should not be used with a lavish hand, let us now consider some of its advantages for use in reasonable quantities. First of all, it is interchangeable with natural or manufactured gas in any proportion, including 100% substitution.

A propane-air plant can be placed close to the point of demand and thereby help to solve the ton-mile transportation problem on the peak days when pipeline facilities may be extended to their limit. Unlike some other types of peak shaving plants, a propane-air plant can be started up and shut down quickly, making it ideal for use on peak hours of a number of days during the winter season. It it is electrically operated, it can actually be made to operate on push button control. Whether electric or gas engine driven compressors are used, a five or even a seven million a day plant can be operated with one man per shift. Its ratio of effective output volume to storage volume is about 700 to 1 foot, that is to say, for every cubic foot of liquid in storage, there will be more than 500 cu. ft. of plant output gas, and this output gas will replace or be equivalent to 700 cu. ft. of 1,100 B.Th.U. natural gas.

Propane-air plants can be constructed to have almost any desired maximum send out capacity, from less than half a million a day to more than 50 mill. a day. Even more important is the fact that regardless of the maximum rate of the plant, it can be designed to have a satisfactory, stepless turndown of at least 10 to one.

Until 1944, it was general practice for propane-air plants to depend on winter delivery for from one-half to two-thirds of their requirement. Since 1944, many plants, both large and small, have been built. The total volume of propane used has increased by geometrical progression. Each year the volume used was about one and a half times that of the previous year. Of course, the supplier has increased his production capacity and transportation facilities. In spite of this increased supply and the fact that 'distress' material was available during the entire winter season of 1948-49, it is the writer's opinion that for a normal winter season the winter demand for propane may again exceed both the supply and the transportation facilities.

From a paper presented to the Natural Gas Department, American Gas Association.

INTERNATIONAL STANDARDISATION

MEETINGS of various Technical Committees of the International Organisation for Standardisation (the ISO) have recently been held in Paris and brief notes have been issued by the British Standards Institution on the work of the committees dealing with bolts, nuts, and accessories; limits and fits; preferred numbers; screw threads, and welding.

The first meeting of the Technical Committee on Welding took place under the chairmanship of M. Leroy, Director of the Institut de Soudure, who was nominated in accordance with custom from the delegation of the secretariat country, France. Seventeen nations were represented, including the United Kingdom, whose delegation was organised through the British Standards Institution. In reviewing previous international work, the Chairman recommended the adoption of the work of the former International Standards Association Committee as a basis for their own future work, and he mentioned that the International Electrotechnical Commission had passed over the work of its own standardisation committee to ISO with a desire to be informed of progress.

The first meeting of the Technical Committee on Screw Threads was of interest in view of the recent Anglo-American agreement on the Unified Screw Thread. The secretariat of this Committee is in the hands of Sweden, who had sponsored a number of proposals for a basis for a single world system of screw threads. The British delegation, organised through the British Standards Institution, recommended that it would be better to recognise the fact that for the foreseeable future there must be two systems, one for the metric and the other for the inch basis of measurement, but that a step forward might be made by agreeing on a standard profile for triangular threads in both these systems.

This proposal was accepted. The unified screw thread system for sizes from ¼ in. and upwards was accepted for the inch basis, and the profile of the unified thread was accepted for metric screw threads having a pitch of 1 mm. and over. This resolution was not accepted by the delegations from the U.S.S.R. and Italy, while the delegation from Czechoslovakia reserved its decision. The Committee laid down a programme for standardising threads with triangular profiles both above and below 6 mm. diameter, and also threads with other than triangular profiles, and a small working commission, on which the United Kingdom will be represented, was appointed to assist the Swedish secretariat in the preparation of documents and data for this future work.

The first meeting of the Technical Committee on Bolts, Nuts, and Accessories was attended by representatives of 14 nations, including the United Kingdom. The scope of work to be undertaken by the Committee was discussed and it was agreed that it should cover 'bolts, nuts, and metal thread screws, of the most commonly used types, and accessories (such as washers and split cotter pins).' It was agreed that items such as rivets, boiler stays, and all bolts and screws of limited use should be regarded as outside the scope of the work.

It was agreed that the programme of work should be to prepare internationally agreed recommendations dealing with all important dimensions of the products coming within the scope of the Committee, with their tolerances (with the exception of thread tolerances) and to prepare a system of symbols indentifying in a non-ambiguous way all kinds, varieties and important characteristic features of the products, *e.g.*, machining finishes and grades of accuracy.

As a basis for discussion the Secretariat had prepared extensive proposals relating to a system of identification symbols, a general plan of dimensions for all of the common types of bolts, nuts, and screws, and suggestions for definitions relating to the overall lengths of bolts and screws and to the length of thread. Since the proposals relating to general dimensions and identification symbols required considerable detailed study on the part of the participating nations it was agreed that each country should, within the next three months, submit its suggestions and comments on the proposals. The Secretariat would then prepare new proposals in the light of the comments submitted and circulate them to the participating countries for their further study.

ONE THING LEADS TO ANOTHER

By J. W. YOUNG,

Engineer and Manager, Lurgan Gas Department

The author, who is interested in model and experimental engineering work, recounts the development of some simple and inexpensive apparatus which can be worked in conjunction with existing plant to improve plant performance. Almost all the apparatus has been developed by practical experiments carried out over several years and it is now reduced to great simplicity. The paper is an attempt to help the manager of the small works, and the author is satisfied that where his system has been introduced in larger undertakings the results have been more than satisfactory.

POSSIBLY my reference to the application of that humble and unscientific piece of apparatus—the common flatflame burner—as a means of quality control may call for criticism ; nevertheless, be it scientific or not, when used in the right combination—as you will see—it is capable of being a most useful aid to the control of C.V.

The apparatus to be dealt with is mostly in connection with the production of gas—a matter of concern to many of us today —and with coal over twice pre-war prices bulk for bulk, generally of an unsuitable quality, and with an inclusive ash percentage materially higher, the question of costs of gas production is one that cannot be ignored, and all efforts should be directed towards obtaining the utmost efficiency in this end. Gas engineers as a body are well satisfied that their processes are efficient, but it must be admitted that many works are having to carry on with plant which is out of date. In my own case I was up against it, due to inadequacy of plant in certain sections plus a rapidly rising output, and with the difficulty experienced in obtaining equipment it was necessary to do some quick thinking.

Obsolete Plant

The 'gas makers' consisted of eight 33 in. continuous verticals and four 40 in. continuous verticals, plus the usual ancillary gear. The washer, scrubber, and purifiers were rated at 250,000 cu.ft. per day, but the capacity of the condensers must have been even below this figure ; they were of the annular air cooled type and rarely cooled the gas below 140° F., and with makes at times approaching 600.000 cu.ft. per day it was not to be wondered at that technically serious and costly happenings began to make themselves felt.

Purifiers became almost entirely out of hand and it was a case of frequent swinging, emptying and refilling, with the result that the oxide never got a chance to revivify and so the vicious circle was complete. To make matters worse, tar fog was not only present at the inlet to the boxes, but was actually passing through the purifiers and into the district. The maintenance of appliances became a nightmare, to say nothing of the alarming failure of meters.

Gum Formation

I have been told that my trouble was a bad case of gum formation and that tar fog being more or less in mechanical suspension should have been removed by the filtration effect of the purifiers. Perhaps it should have been, but in this instance it was not. The vapour was distinctly visible at the last purifier and an impingement test of the gas gave a stain within a few minutes. With the general position as it was, I carried out a survey of the plant to see what immediate steps could be taken to improve the efficiency of the existing apparatus and decided to augment the action of the condensers by water cooling them, drawing water from a below-ground holder tank and returning it for re-circulation. In addition, the tar and liquor flows to the hydraulic mains were increased and water mist loading of the crude gas undertaken. As was to be expected, these changes reduced the gas temperature considerably. Stock was taken of the retort steaming position and it was evident that an excessive amount of undecomposed steam was passing forward to the condensers. This was accentuated by reason of relatively poor heats due in turn to a poor coke in conjunction with producers too small to meet requirements.

Although on first sight it could be ill afforded, arrangements were made to admit producer gas for dilution purposes so that the steam ratio could be cut down. There was as a result of this change a slight temporary reduction in make per ton, but on costing, the greater yield of a more saleable type of coke more than turned the balance. In addition, the larger and denser coke produced showed a distinct improvement in the performance of the producers and the starvation of producer gas on the setting was eased. Retort temperatures rose and purifier inlet gas temperature decreased to 80° F. Our joy was to be short-lived, however.

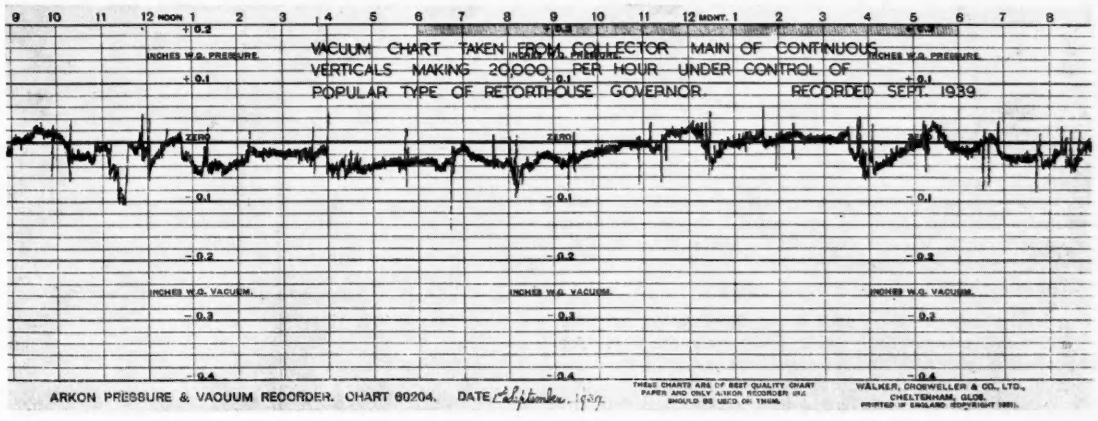

VACUUM CHART TAKEN FROM COLLECTOR MAIN OF CONTINUOUS VERTICALS MAKING 20,000 PER HOUR UNDER CONTROL OF POPULAR TYPE OF RETORTHOUSE GOVERNOR.
RECORDED SEPT. 1939
INCHES W.G. PRESSURE
INCHES W.G. VACUUM
ARKON PRESSURE & VACUUM RECORDER. CHART 60204.
WALKER, CROSWELLER & CO., LTD., CHELTENHAM, GLOS.

Fig. 1.

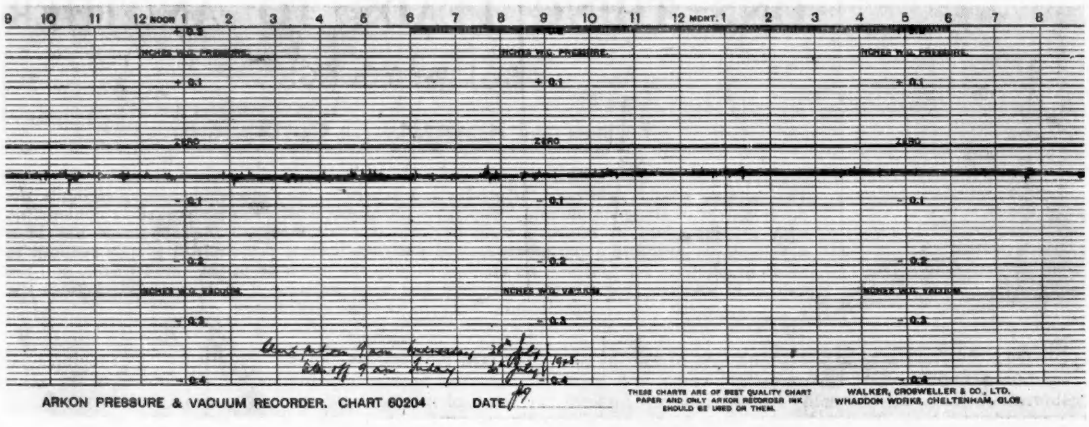

9 10 11 12 NOON 1 2 3 4 5 6 7 8 9 10 11 12 MDNT. 1 2 3 4 5 6 7 8
ARKON PRESSURE & VACUUM RECORDER. CHART 60204
DATE
WALKER, CROSWELLER & CO., LTD.
WHADDON WORKS, CHELTENHAM, GLOS.

Fig. 2. Vacuum chart taken from identical position of Fig. 1 recording, showing the results obtained after fitting the governor with the electro-hydraulic relay attachment. It is interesting to note that the chart was allowed to take a second day's reading superimposed upon the first before changing the chart.

With characteristic secrecy, a factory was rapidly converted for the manufacture of aircraft parts. Various pieces of gas equipment were installed and the demand proved to be about 18 mill. cu.ft. per annum. With this load suddenly thrust upon us, our purifiers again started to give trouble, so there had to be a substantial increase in the O_2 percentage. Tar fog became a problem once more and all previous efforts were re-

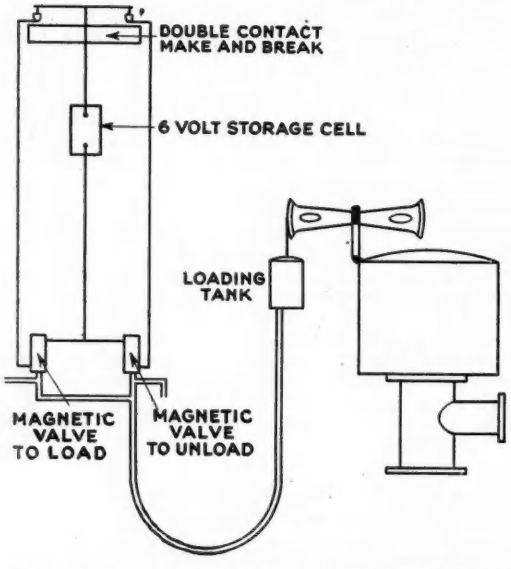


Fig. 3. Electro-hydraulic retort house governor relay attachment as originally planned.

doubled. To reduce gas temperature, we continuously sprayed all exposed pipes and plant—even the first taker purifier lid was so treated. With the ageing of our verticals, together with the steady deterioration of coals available for gas making, the CO_2 content of the gas had become unduly high and investigations were immediately commenced to track this down.

A careful Orsat check on each retort showed that the CO_2 varied through comparatively wide limits over the day. An examination of governing indicated that variations in the pressure conditions within the retorts were occurring, and it was obvious that these variations could have none other than ill-effects on the whole. Governors were cleaned out and the entire system examined for chokes, but little improvement was effected, and so more frequent hand applied corrections had to be made.

Governor Corrections

My thoughts turned towards methods for automatically changing the weight loading of the governor, or—in effect—means of applying the necessary corrections to the governor to compensate, for example, variation in outlet vacuum and rate of make per hour. So the idea of a relay attachment was born. In view of the general layout of the plant it was considered that electrical transmission of impulses would be the simplest way of superimposing the necessary corrections upon the governor.

There was to be a water loading tank of a few pints capacity attached to the weight loading side of the bell type governor. Situated at or impulsed from the nearest common point of entry of hydraulics into collector main there was to be a sensitive contact make and break, adjustable for various pressure conditions, with contacts to be made and broken by the varying of the pressure within the retorts from the standard set.

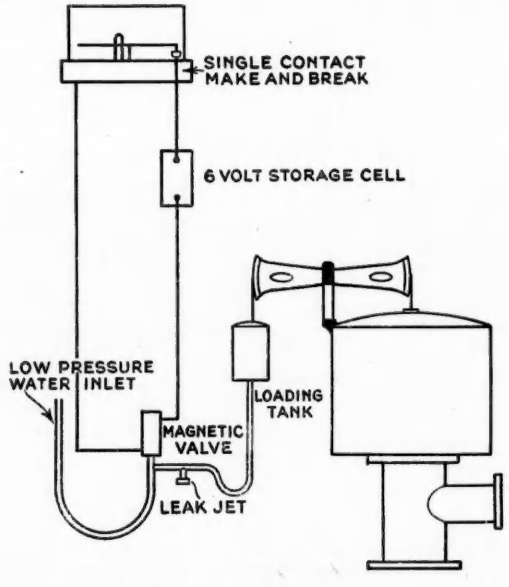


Fig. 4. Electro-hydraulic retort house governor relay attachment simplified.

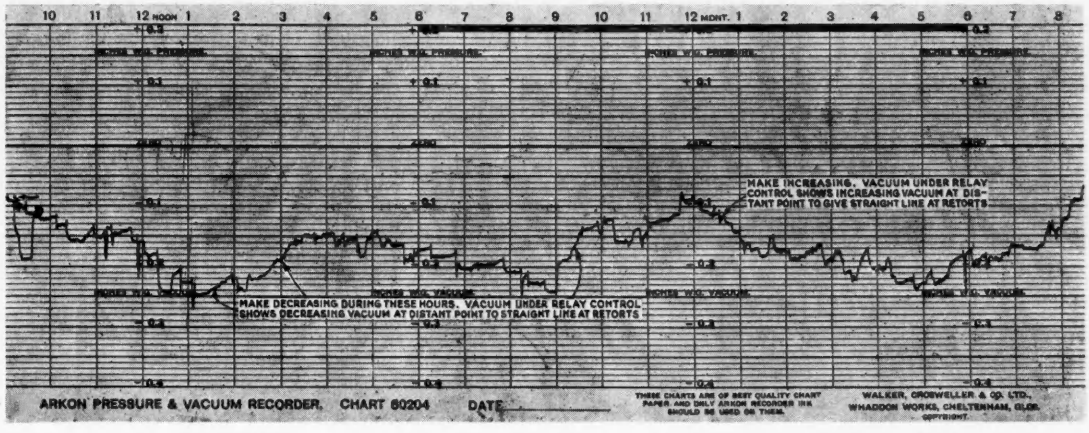

MAKE DECREASING DURING THESE HOURS. VACUUM UNDER RELAY CONTROL SHOWS DECREASING VACUUM AT DISTANT POINT TO STRAIGHT LIKE AT RETORTS
MAKE INCREASING. VACUUM UNDER RELAY CONTROL SHOWS INCREASING VACUUM AT DISTANT POINT TO GIVE STRAIGHT LINE AT RETORTS
ARKON PRESSURE & VACUUM RECORDER. CHART 60204 DATE
WALKER, CROSWELLER & CO. LTD., WHADDON WORKS, CHELTENHAM, GLOS.

Fig. 5. Vacuum chart which has been recorded at a point near to the exhauster and some considerable distance away from the common point entry of hydraulics into foulmain on a horizontal installation shows the infinite number of automatically applied corrections necessary to maintain at the retorts a chart after the type of Fig. 6.

The simplest way of transmuting the movement of an electric contact into establishing or restricting a water flow seemed to be the use of a magnetic valve, so experiments were conducted along those lines. Eventually a suitable and highly reliable pilot controller was evolved, which has now had almost five years continuous service. (See Fig. 3, leading up to final model —Fig. 4.)

The remarkable improvement in governing since fitting the controller to a standard old type counterbalanced bell retort house governor will be apparent from an examination of the prints of charts shown in Figs. 1 and 2.

A Typical Installation

To describe a typical installation of the relay as applied to a retort house governor we have :—

(1) A small water loading tank attached to the weight loading side of an existing governor, with a magnetic valve adjacent to control the inflow of water to the tank.

(2) A low head water supply of not more than 1 lb. per sq. in. pressure approximately 27 in. head.

(3) Direct current, preferably from accumulators, 6-volt trickle charged at one-quarter of 1 amp.

(4) A contact make and break, pressure impulsed from a point in the collector main as close as possible to the source of gas production.

(5) A leak jet to allow water to flow from the loading tank continuously.

The action is as follows : Assuming the governor to be in the required state of balance with the loading tank about half full of water, then water will be flowing from the leak jet, tending to reduce the loading on the governor and so to reduce vacuum on the retorts. This reduction of vacuum or increase of pressure on the retorts will close the contacts at the contactor.

The closed contacts will complete the circuit and energise the magnetic valve, allowing water to flow into the loading tank more quickly than it can run through the leak jet, causing the governor to increase the vacuum, opening the contacts, and so the cycle is repeated. The form of control afforded is of the sawtooth variety, of negligible amplitude. In practice movement of as little as one teaspoonful of water to and from the bulk of the water in the loading tank will cause the correction to be applied, and there is always some action taking place. The current consumption of the attachment is about 1½ watts, or, if you would prefer it, almost 666 hours for one unit of electricity—say one farthing per week. The water is about 4 gal. per hour, which can be used for producers, &c.

Effect of Pressure Conditions

The proper control of pressure conditions within the retort is a matter of prime importance in prolonging the life of the setting and obtaining the maximum yield of gas of a steady quality. Different carbonising installations have their own

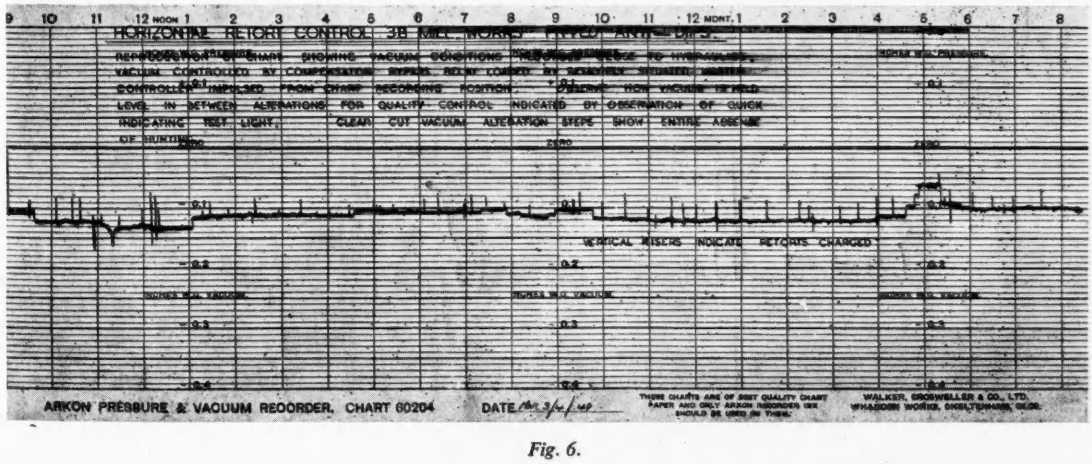


Fig. 6.

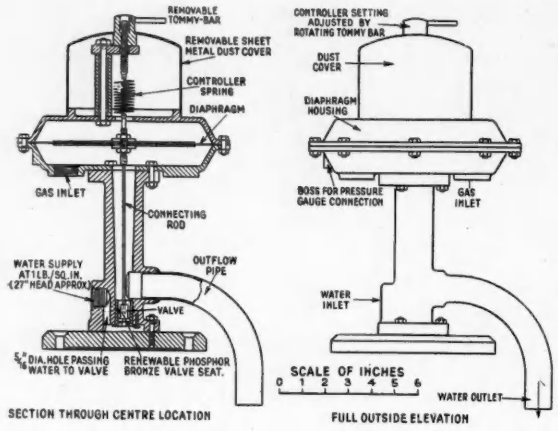


Fig. 7. Relay vacuum controller.

peculiar requirements, but pressure governing is common to all types. In general, troubles associated with pressure may be placed in two categories with all types of retort. They are those connected with positive pressure and those associated with negative pressure or pull. Each extreme has primary effects which bring along secondary effects in their train.

Excessive pressure within the retort leads to a loss of gas due to leakage coupled with the danger of overheating in the flues, and gives more deposition of carbon at the expense of

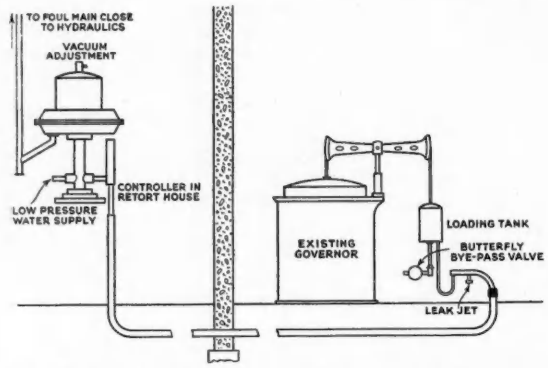


Fig. 8. Example of relay remote control of exhauster compensator governor in a horizontal retort installation.

therms due to overcracking of the hydrocarbons, thereby reducing the throughput and heat transfer. On the other hand, it tends to preserve and, indeed, increase the tightness of the retort, making the retort more resistant to leaks. If, however, the retort is relatively very leaky, due to age, then losses become serious.

Excessive pull causing leakage of furnace gases into the retorts discourages the formation of a carbon deposit in the pores and in fact tends to remove any such deposits. Therefore, any leaks which exist are likely to continue to be persistent and to become worse. If a leaky retort be examined, sharp variations in the depths of carbon may be observed. This roughness seriously affects the travel of the coal in vertical retorts, making it necessary to scurf the retort more frequently or, in effect, reduce the plant capacity.

The difference between excessive pressure and pull is in practice quite small, being of the order of three to five hundredths, but during normal working it is absolutely desirable that positive pressure conditions should prevail at the gas offtake. There is no doubt that following upon a period of ideal pressure conditions the application of an overpull does tend to enhance the make, temporarily at any rate, but in the end over-exhausting does not pay. If, however, the retorts are in bad condition, there is perhaps no other course as a temporary measure.

In the case of vertical retorts, the control of pressure is of greater importance than in the horizontal retort owing to the chimney effect, and even with a definite and apparently excessive pressure at the top of the retort it is quite possible that there may be a vacuum lower down in the retort.

Close Regulation Essential

Close regulation of pressure conditions is essential for best results and reasonable life of plant, and attention to the means provided for the regulation will repay. The same principles hold for horizontals as for verticals, but in the smaller works the attainment of correct conditions is not always so simple. For example, there may be no auxiliary plant, such as water gas or producer gas, to balance variations in calorific value brought about by the intermittent nature of the charging or variations in coals, and apart from the mechanical limitations brought about by the almost universal degree of seal unevenness if seals be employed.

There is a strong case for dry main working. Commonly, dry main working is associated with requirements in the nature of anti-dip valves of some form or another, but I can say from practical experience that the use of such valves is not an absolute necessity. It is necessary, however, to have good governing and also to realise that degrees of vacuum or pressure must be in terms of hundredths of one-inch water gauge not in inches or tenths.

Having previously considered the question of a suitable non-electric system for those works where electricity was not con-

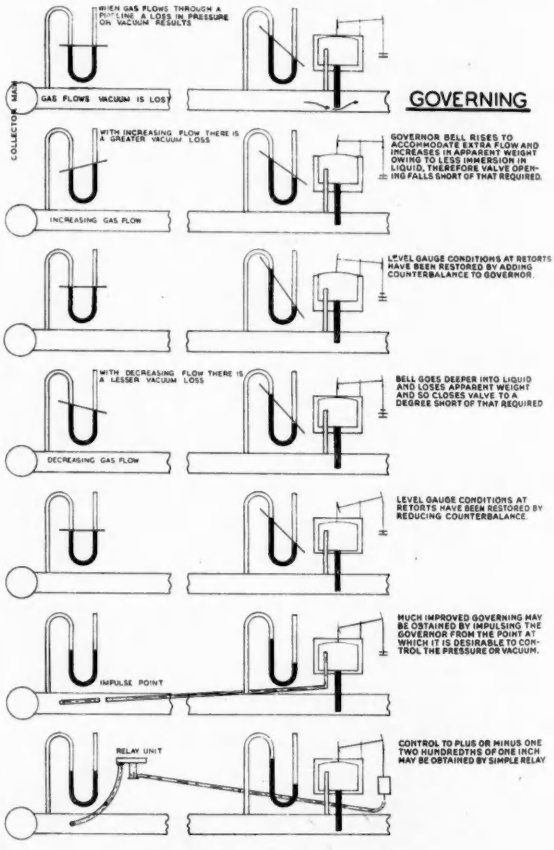

WHEN GAS FLOWS THROUGH A PIPELINE A LOSS IN PRESSURE OR VACUUM RESULTS
COLLECTOR MAIN
GAS FLOWS VACUUM IS LOST
GOVERNING
WITH INCREASING FLOW THERE IS A GREATER VACUUM LOSS
GOVERNOR BELL RISES TO ACCOMMODATE EXTRA FLOW AND INCREASES IN APPARENT WEIGHT OWING TO LESS IMMERSION IN LIQUID, THEREFORE VALVE OPENING FALLS SHORT OF THAT REQUIRED.
INCREASING GAS FLOW
LEVEL GAUGE CONDITIONS AT RETORTS HAVE BEEN RESTORED BY ADDING COUNTERBALANCE TO GOVERNOR.
WITH DECREASING FLOW THERE IS A LESSER VACUUM LOSS
BELL GOES DEEPER INTO LIQUID AND LOSES APPARENT WEIGHT AND SO CLOSES VALVE TO A DEGREE SHORT OF THAT REQUIRED
DECREASING GAS FLOW
LEVEL GAUGE CONDITIONS AT RETORTS HAVE BEEN RESTORED BY REDUCING COUNTERBALANCE.
MUCH IMPROVED GOVERNING MAY BE OBTAINED BY IMPULSING THE GOVERNOR FROM THE POINT AT WHICH IT IS DESIRABLE TO CONTROL THE PRESSURE OR VACUUM.
IMPULSE POINT
RELAY UNIT
CONTROL TO PLUS OR MINUS ONE TWO HUNDREDTHS OF ONE INCH MAY BE OBTAINED BY SIMPLE RELAY

Fig. 9. Phases of governing.

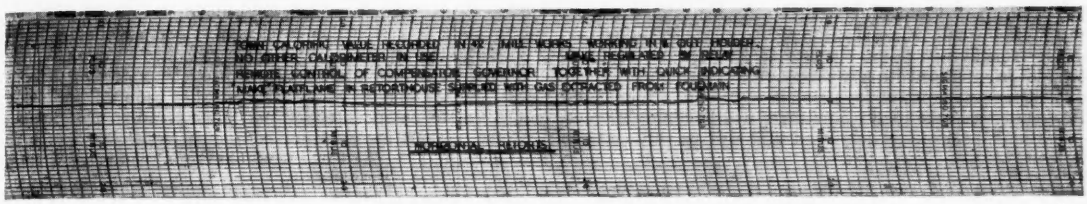


Fig. 10.

veniently available, I returned again to this line of thought and in due course an experimental device was fitted out for controlling a bench of horizontal retorts.

Time will not permit of a detailed description of the apparatus which, containing only one moving part, is so simple as to be easily understood (see Figs. 7 and 8). As before, it works on the leak jet principle, but unlike the electro model has a floating action, or, in other words, the inflow of water to and from the loading tank exactly balance under equilibrium conditions.

In one of the installations a bench of 'dry main' horizontals is controlled by a normal compensator governor situated at the exhauster. Apart from the governor receiving impulses from the pressure conditions within the exhauster inlet main close to

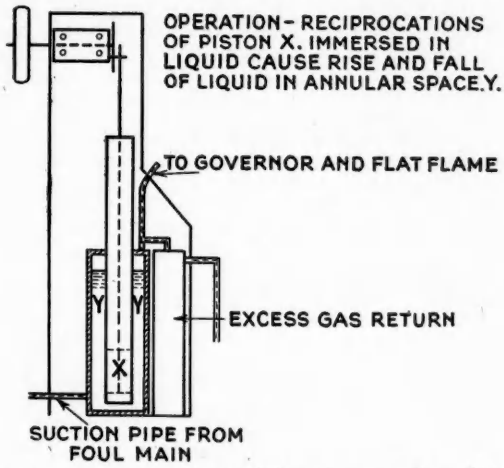

OPERATION - RECIPROCATIONS OF PISTON X, IMMERSED IN LIQUID CAUSE RISE AND FALL OF LIQUID IN ANNULAR SPACE Y.
TO GOVERNOR AND FLAT FLAME
EXCESS GAS RETURN
Y
Y
X
SUCTION PIPE FROM FOUL MAIN

Fig. 11. Installation of test light exhauster where drive is available at position of test light.

the governor, it is also fitted with the usual loading tank connected to the water flow end of the pilot controller, which is situated in the retort house some distance away. The controller is impulsed from a position in the foul main as close to the hydraulics as possible and therefore the required degree of vacuum or pressure is maintained at a point as close to the retorts as is practicable.

In addition, it has been found that the remote control of the governor has brought about more interest by the stokers, as it is not now necessary to visit the exhauster house for the purpose of changing weights.

Any governor to be reasonably effective must at least be impulsed from the point at which it is desired to control the pressure or vacuum. If this be not the case a number of factors are at once introduced which make good governing impossible. We have :—

(1) The influence of pressure drop along a main when a flow of gas takes place ; in other words, between any two points in a main there is always a loss in pressure.

(2) The effects of variable specific gravity—if a governor be impulsed from a point lower than the position at which it is desired to control the vacuum, errors will obviously be introduced by the variable weights of the column of gas.

(3) Temperature of gas in a descending main will have an effect on the weight of gas as in No. 2.

(4) The general variable resistance factor of any main plus plant due to tar deposition.

Variable Flow of Gas

In addition, there is the factor of variable flow of gas to be considered. With a definite make or flow rate per hour the governor will have a certain valve opening, and by reason of the bell being connected to the valve the bell will have a corresponding degree of immersion in the sealing liquid. Now, should the flow of gas increase, in order to maintain the pressure constant at the point from which the governor is impulsed from, it is necessary that the valve should open in the case of a retort house governor and close in the instance of a compensator governor. Whichever be the case makes no difference as the bell has in any case to vary its depth in the seal. The principle of Archimedes states : 'If a body is weighed in air and in a liquid the apparent loss in weight is equal to the weight of liquid displaced.'

In practice, therefore, the lifting of the bell to accommodate a greater flow of gas will call for an applied correction in the form of increased loading of the counter balance. (See phases of governing—Fig. 9.) Similarly, when the bell descends to accommodate a lesser flow of gas it will become lighter, in effect, calling for a reduction in counterbalance. Apart from the other factors over which the governer has to exert control, it is obvious that conditions cannot be kept so constant in any retort house as to maintain a perfectly steady rate of gas make.

Reduced to every-day requirements and in particular to those applying in the small and medium sized works, the tendency of a governor is towards a falling off in vacuum with increased gas flow and the opposite with reduced flow. The reverse is in reality required ; fresh retorts in swell the rate of production and at the same time demand a greater amount of diluent

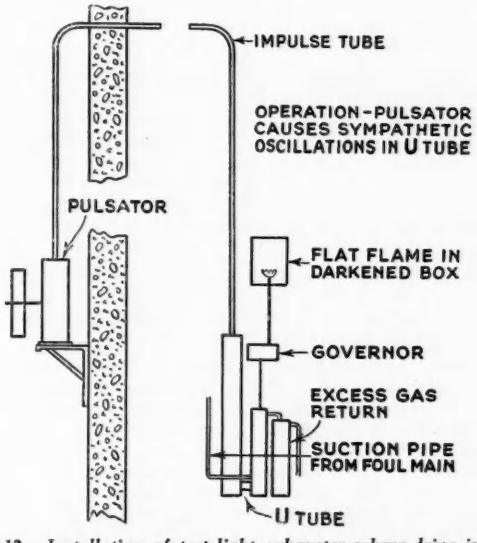


Fig. 12. Installation of test light exhauster where drive is not available at position of test light.

gas to be taken in for quality control. As the retorts are carbonising off the rate of production is dropping, so is the C.V. With the reduction in make, the loss of pressure in the run of foul main from retorts to the governor impulse point is *less*, and as the governor is set to maintain a definite vacuum, due to the lower resistance to gas flow there will be a smaller pressure loss and therefore an increased pull will be thrown upon the retorts.

When a retort or retorts are freshly charged there will be an increased flow of gas. With the increased flow there will be a greater pressure loss between any two points in the foul main and therefore the governor must be set to pull more to overcome the extra resistance. The extra pressure resulting within the retorts, when in reality there should be a reduction in pressure, means that there may be a loss of gas due to a leakage

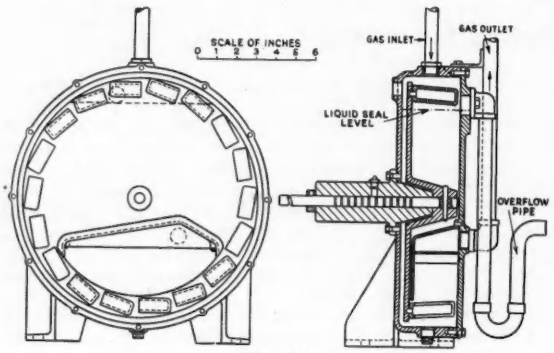


Fig. 13.

and over-cracking, and also a loss in therms due to high C.V., which may get straight on to the town during high demand periods. Improvements in governing may be brought about by impulsing the governor from the point at which it is desired to control the pressure or vacuum, but even this alteration at the best will not produce results anywhere near those obtainable by the simplest of relay means.

Summing up, non-relay governors will call for an adjustment to compensate exactly for varying gas flows—in short, the response is not square law, or in other words the effective valve opening is not in direct proportion to the rate of gas throughput. Nevertheless, to give credit where due, at least one excellent bell type governor is made in which the inherent defects are minimised.

A Pleasing Picture

In the works example given, now fitted with a relay loader on the compensator governor, we have a much more pleasing picture. Impulses are transmitted from the nearest common point junction of hydraulics and foul main to the existing and quite normally connected exhauster compensator governor through the medium of a pilot valve controlling a flow of water to the loading tank. The controller (pilot valve) is situated in the retort house, thereby affording *remote control of the vacuum.*

In order to get some idea of the accuracy of control afforded, see Fig. 6, which shows hydraulic main vacuum, and in particular notice the way in which the vacuum is held dead level in between adjustments for quality control.

Contrast this chart with Fig. 5, which although not taken at the same time as Fig. 6, shows typical vacuum requirements at the distant point in order to give a chart of the type of Fig. 6 recorded close to the common point of entry of hydraulics into collector or foul main. Fig. 5 chart when viewed without a full knowledge of the facts would be meaningless, but a careful analysis will show that varying rates of makes, have more influence than could be imagined on the working of a governor.

For example, take that portion of the chart (Fig. 5) between approximately 1.10 p.m. and 1.55 p.m. and notice the gradual decrease in vacuum which is occurring. This is particularly interesting as a reduction in vacuum is being gradually brought about by the influence of the relay control. In other words, as gas flow is reducing and foul main resistance to flow becoming less, the vacuum is being automatically reduced by a degree sufficient to compensate for the lesser pressure drop sustained by the gas. If the governor had not been fitted with the relay attachment, a falling make would have given increasing vacuum characteristics on the retorts, which is absolutely the reverse to actual requirements. The vacuum variations in the foul main at a distant point to the retorts show the necessity for the vacuum gauge to be connected near to the retorts—an elementary point, but sometimes overlooked.

In short, with relay fitted to any governor the actual position of the latter in the pipe line is of little importance as it is the pilot governor or controller impulsed from a point close to the retorts which supplies the necessary correction. Furthermore, from experiences I have had it would appear that the simplest type of governor, even a home-made one, can be made to yield results and control accuracy equal to any.

The size of the normal equilibrium pipe to the underside of the bell is of importance—a comparatively large pipe making for a livelier bell, the pulsations of which in practice bring about an average control point. With the high price of coal nowadays there is a lot of money to be saved individually and to the nation by attention to this matter of governing and also by the abolition of seals. In many works the fitting of anti-dip valves will effect such a saving as to pay for the installation in a year or two—surely a good investment. My remarks and the examples given for the sake of simplicity are based upon the conditions generally met with in the smaller works (assuming in this instance that quality control is by overpulling), but it will be obvious that regardless of the size of the undertaking governing is of the same importance and the fundamental similarities exist in all sizes of undertakings. In passing might I suggest that you examine your retort pressure conditions—you

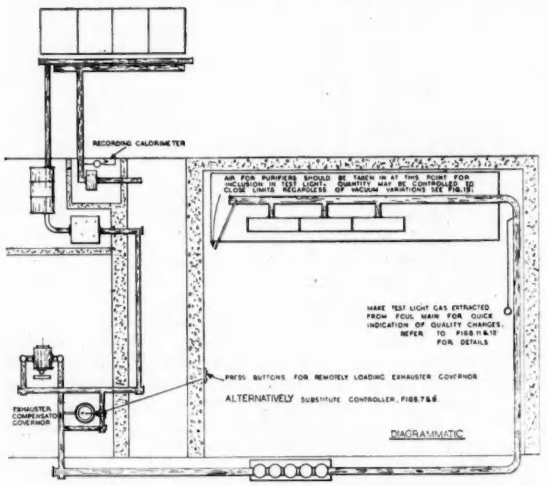

RECORDING CALORIMETER
AIR FOR PURIFIERS SHOULD BE TAKEN IN AT THIS POINT FOR INCLUSION IN TEST LIGHT. QUANTITY MAY BE CONTROLLED TO CLOSE LIMITS REGARDLESS OF VACUUM VARIATIONS SEE FIG.13
MAKE TEST LIGHT GAS EXTRACTED FROM FOUL MAIN FOR QUICK INDICATION OF QUALITY CHANGES. REFER TO FIGS.11&12 FOR DETAILS
PRESS BUTTONS FOR REMOTELY LOADING EXHAUSTER GOVERNOR
ALTERNATIVELY SUBSTITUTE CONTROLLER, FIGS.7&8
EXHAUSTER COMPENSATOR GOVERNOR
DIAGRAMMATIC

Fig. 14. Typical retort house installation of hand remote control of governor and quick acting 'make' test light.

will be surprised at the involuntary variations which actually take place.

Calorific Value Control on Small Works

The consistent control of calorific value sometimes presents a difficulty on the smaller works where technical supervision cannot for economic reasons be too specialised. In all examples of gas-making practice, basically in order to obtain a record or indication of calorific value of the make gas with, perhaps, a visual indication in the form of a lighted flat flame burner, it is customary to bleed off a continuous sample of gas from the make stream.

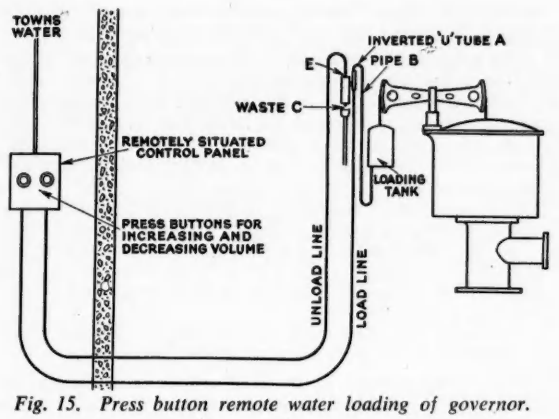


Fig. 15. Press button remote water loading of governor.

For the operation of quality indicators (calorimeters) it is necessary to use purified gas under pressure, which presupposes that the offtake point shall be on the pressure side of the works exhauster, or in effect some distance away from the source of gas production resulting in a considerable lag in response of the quality indicator to changes which may be taking place in the make gas due, for example, to proceeding distillation, vacuum alterations, variation in producer gas intake, coal differences, together with the 101 other factors or attentions of the 'Gremlins' which we have all experienced.

In an average coupling-up of C.V. indicating apparatus, a lag of 30 minutes or more is quite common, and under these conditions control of quality must be largely a matter of rule of thumb and anticipatory action. This is quite unsatisfactory. Requirements or conditions are never twice the same in any retort house. Perhaps blind working, so to speak, might be permissible for comparatively long periods in the case of continuous vertical retorts which give a relatively steady quality not likely to deviate rapidly from the set standard, but with horizontals and intermittent retorts there are more serious and frequent changes of C.V. to contend with.

In short, I suggest there is no way of consistently regulating calorific value and at the same time obtaining the greatest efficiency from the gas producing plant unless the effects of vacuum changes, &c., in terms of quality, can be seen within the shortest possible time from the instant of making the last control change.

These are exacting requirements—it would take an average calorimeter several minutes to get the gas from its governor inlet to the burner itself, and having got it there, it would take a further considerable time to overcome heat saturation lag and to show full deflection. I stand to be corrected, but I imagine that there would be a lag of anything up to 15 minutes from these factors alone, apart from the time taken to get gas from the retorts or blending point to the instrument governor inlet.

Offsetting Time Lag

Attempts have been made to offset time lag due to volume of gas plant to be swept, by tapping off the gas sample at the outlet of exhauster, washer, detarrer or scrubber, and passing same through a miniature oxide purifier, and while this may appear to be an improvement on first examination, a moment's further consideration will show that unless the purifier is relatively large to be reasonably effective for, say, the 5 cu.ft. or so passing per hour to calorimeter and line purging flatflame burner, changes of oxide will be frequent owing to the first taker position of the purifier. If, on the other hand the purifier is large enough to give a reasonable period in use between changes of oxide, then time lag is again a factor to be considered and no advantage results.

Accepting, therefore, that with orthodox methods little could be done to reduce the time necessary to get the make through to the calorimeter from the retorts, I was prevailed upon to experiment with unorthodox couplings.

I did satisfy myself that a speedy means of indicating changes in make C.V. was absolutely essential for the best results and that rule of thumb control was dependent on perfect and unvarying retort house conditions, quite impossible to ensure.

Clearly, in order to get a quick indication of the quality of gas being made, it is necessary to have the indicating device supplied from a point as close to the source of gas production as possible, and this would suggest that the gas should be extracted from the foul main. Unfortunately, the gas from this position requires purification before it would be used in a calorimeter, and even if this could be completely and consistently done, there would still be the heat interchange lag of the instrument itself.

I have found that the simple flatflame burner consuming washed crude gas coupled to the plant so as to ensure a really quick visual indication of changes in the C.V. was an excellent guide, but it must be arranged in such a way that the gas burning shall not lag more than ½ to 1½ minutes behind the instant when the actual change in C.V. should occur in order to reasonably permit of 'inching' control. It is surprising how close the human eye can evaluate calorific value by observation of a flame.

By using a quick indicating test-light plus press button or relay remote control of governor, it will be found easy to 'inch' the control or diluent gas admission to give at the worst a steady quality somewhere near the mark, and to hold it there so that an intelligible reading may be taken from the distant indicating or recording calorimeter. (See Fig. 14.)

Make charts No. 1 and No. 2 indicate respectively the make quality maintained under orthodox methods and following upon the installation of relay remote control of vacuum (compensator governor only) plus quick indicating test light.

A little consideration will show that a rapidly applied approximately correct increase in pull after a fresh retort in, will enable the maximum thermal yield to be taken out—bear in mind owing to the speed with which C.V. changes can be detected trial and error loading of the governor is feasible. Similarly a rapid checked overpull will result in less chokes, again making for a greater thermal return.

Amazing Results

To many engineers it may appear quite impossible to think of so simple a device as a flatflame burner as a means of controlling calorific value, nevertheless I can assure you that when a really quick indicating coupling is used in conjunction with the usual C.V. measuring apparatus you will be amazed at the results which can be obtained in practice. (See portion of town C.V. ex 42 mill. works.—Fig. 10.)

I can state quite definitely, without fear of contradiction, that with the average conditions obtaining in small and medium undertakings, the system outlined above will not only allow of a more even calorific value being maintained, but will give a substantially greater thermal yield per ton of coal carbonised.

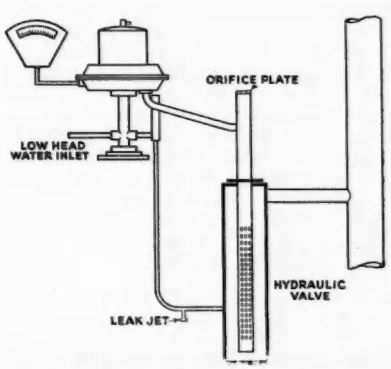


Fig. 16. Controlled air supply for purifiers in works where it is the practice to admit air on vacuum side of exhauster.

Another elementary point is that a visual indication is available in the retort house where observations may be made more readily and frequently by the stoker on duty. It will have been obvious to all that as the foul main is under a vacuum, or approaching level gauge conditions, some form of pump or exhauster to draw the gas out is indicated.

Here again the process of evolution and the reduction of an idea to the necessary simplicity in action took time and many experiments, but was successfully brought to a workable form over 10 years ago with the development of a pump which has proved to require literally no maintenance, and has worked in a number of applications continuously since that time.

Although the apparatus has recently been superseded by an even simpler design of exhauster, I feel that a brief description of the older models would be of interest in passing. In the design of the pump I naturally wished to eliminate all points of construction which would require attention and maintenance. There are, for example, no packing glands or precision fits, and the piston is quite slack in the cylinder, which is a piece of 3 in. steel tube quite unprepared internally. The construction is in the form of a U tube with the piston on one side totally immersed in the liquid. (See Fig. 11.)

The reciprocations of the piston, less slip, are transmitted to the liquid which oscillates in the U tube, the surface of the liquid in the remote limb acting as the piston and the bulk of the liquid itself as a hydraulic seal and gas washer combined.

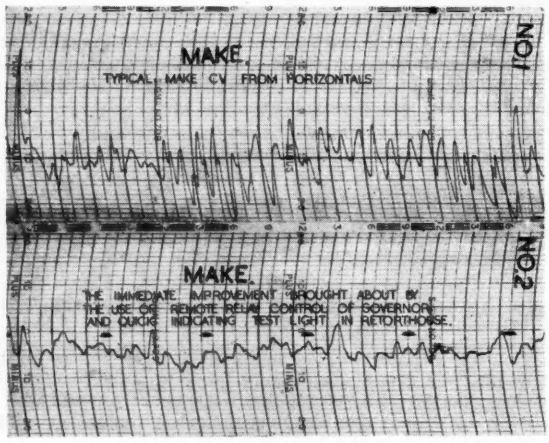

MAKE.
TYPICAL MAKE C.V. FROM HORIZONTALS.
NO.1
MAKE.
THE IMMEDIATE IMPROVEMENT BROUGHT ABOUT BY THE USE OF REMOTE RELAY CONTROL OF GOVERNOR AND QUICK INDICATING TEST LIGHT IN RETORTHOUSE.
NO.2

Fig. 17.

The pump I have in my works has been working for 10 years in a very dusty location and during that time it has required no renewals other than driving belts, nor has it ever been cleaned out except by introducing very occasionally some creosote oil under working conditions, and today it is functioning perfectly.

For those who like statistics the piston has travelled to date 25,000 miles, while the valves have opened and closed more than 315 mill. times. Figs. 11 and 12 illustrate variations in design and applications. If anyone would care to experiment along the lines I have indicated, experiments might be carried out by using a laboratory filter pump to extract the sample of gas for the test light, although I have found that this method is inclined seriously to affect the luminosity of the flame. In one works I have had experience of the device used to give a continuous indication of the combustibility of producer gas which for many reasons varied widely in calorific value, and the failure to light at the lower ranges gave an indication which normally might have gone unheeded.

Water Jet Exhauster

A disadvantage of the water jet exhauster is the relatively high water consumption at about 20 gal. per hour, although if this can be used for coke quenching or other purposes, it ceases to be a problem. Where a continuous overhead supply of liquor is available same might be used in place of water.

The reduction in luminosity phenomenon makes me wonder if these high-efficiency static washers affect the calorific value—perhaps someone here or in the technical press would care to enlighten me on this point. So far as I can remember when warm water was used in the filter pump the diminution in flame luminosity was less, and to treat the matter jocularly maybe we are on to a new way of extracting benzole. The freezing method is of course well known in laboratory circles for determining the benzole content of gas. Further developments have led to the introduction of an entirely new form of miniature exhauster for sampling, which is valveless and has only one moving part. (See Fig. 13.) The motive power may be provided by a gas meter supplied from the main purifier outlet and returned to the foul main or other low pressure main, or by a simple water, steam turbine, or electric motor.

The crude gas drawn in is washed in its passage through the liquid. Fig. 14 shows a typical example of an installation of quick-indicating test light. The make charts Nos. 1 and 2 show the control of make C.V. before and after using the above system. It should be noted that vast as the improvement is, the devices had only been operating 24 hours when the charts were recorded and it could hardly be expected that the stokers had acquired the maximum degree of skill in operation.

Discerning engineers and chemists in very large works have already indicated the value of a specially modified and portable type of the exhauster described above as a means for obtaining representative gas samples over a period.

Indeed, if the unit be turned upside down it could be used for continuously sampling liquids. If the arrangement had been available a few years ago, it would have afforded a means of ensuring a steady flow of crude oil or tar to the burners which were ingeniously contrived by many of my Southern Ireland friends for the purpose of heating horizontal retorts, during the days when absolutely no coking coal was available for carbonisation.

A Press-Button Device

This is a press button age and it is felt that a description of a simple means of affording the remote loading of a governor would be of interest. In the simplest device, water only is the actuating medium. A small water loading tank is suitably fixed to the governor to be remotely loaded or unloaded.

To load, the appropriate distantly situated press-button is momentarily depressed, whereupon a jet of high velocity water shoots over the inverted U tube (A, Fig. 15) and so into the loading tank through the pipe B. If the press-button valve should leak, the velocity of the water would not normally be sufficient to inject over the U tube and so the leakage water would pass harmlessly into the body of the unit and so away to the visible waste at C.

To unload, the unload press-button is operated, whereupon a high pressure jet of water enters the unit at E, causing a vacuum within owing to the venturi effect. Thus the water is sucked out of the loading tank through the pipe B and away to waste at C as before. Similarly, a leaky valve is not likely to affect the unloading.

Electrically operated valves are obtainable which may be adapted for the remote loading of a governor over abnormal distances, but here again provision must be made for possible leakage which can conveniently be done by employing the unit as described, the magnetic valves being merely inserted in the load and unload water lines and wired to the distant control plant.

Regulation of Oxygen Intake

In order to obtain the necessary oxygen for the control of purification it is the usual practice to introduce a certain proportion of air into the make gas stream. Generally, where liquor disposal is a problem it is desirable that the air should

enter near to or at the purifiers, or even to individual boxes.

In the smaller works for the sake of simplicity and where liquor disposal does not present a major problem the air is more commonly taken in on the vacuum side of the exhausters. Usually a considerable measure of uncertainty exists in the actual amount drawn in—vacuum may vary and does vary in practice over comparatively wide limits due to intended variation in vacuum and those which just happen.

With a varying vacuum the control of entry of air by means of a cock is a haphazard business and not likely to lead to consistent results, and following upon the success of my controller in other applications I have worked out a simple form of control of air intake by using a combination of controller and simple hydraulic valve. In one example there is a variable hydraulic seal which in effect offers more or less resistance to the flow of air according to the state of vacuum in the foul or exhauster inlet main. (See Fig. 16.)

The controller portion is similar to that shown previously, with the exception that the water valve opens to admit more water with an increase in vacuum of a depression of the diaphragm.

Assuming that a certain flow of air is taking place and the diaphragm in equilibrium between the spring holding it up and the atmospheric pressure acting downwards due to the vacuum beneath—there always being a vacuum beneath—the diaphragm when air is flowing through the orifice plate—then there will be a flow of water towards the hydraulic valve, but this will be entirely counterbalanced by the outflow of water from the leak jet. In other words, the level of the water seal in the hydraulic valve will remain unchanged.

Now, if the vacuum in the exhauster main should increase, more air would be drawn in for a few seconds, causing a greater differential across the orifice plate and so the diaphragm would be sucked down, thereby increasing the water flow to cause a rise in level of the liquid within the hydraulic valve, increasing the resistance to air flow and restoring the conditions of air flow and diaphragm balance. If the vacuum in the exhauster main should decrease, a lowering of the resistance to air flow would occur by the unscaling of more port area.

A low range vacuum gauge or recorder may be connected to the impulse chamber of the controller and will serve to give an indication of air flow in terms of a fraction of 1 in. water gauge. Experiments are now being carried out which may lead to the development of automatic air proportioning according to rate of gas production.

In conclusion, listeners may have wondered what steps were taken to overcome my troubles permanently and in this respect I am pleased to say that to date a set of oxide purifiers have been installed, four in a line of 800,000 cu.ft. per day capacity (with provision for extension), and it has not been necessary to take a single box after nine months service. A Holmes electrostatic detarrer has been installed and this is performing admirably, detarring up to 20,000 per hour on nine milliamps. It has proved to be absolutely trouble free. This plant is particularly interesting as it employs a very modest 15,000 volts only at full load which gives about 20 milliamps static discharge.

Additional vertical water tube condensers are also in process of being installed by Kirkham, Hulett and Chandler and also a Humphreys and Glasgow C.W.G. plant.

GASIFICATION OF POWDERED COAL IN SUSPENSION WITH OXYGEN

The Institute of Gas Technology, Chicago, publishes in the current issue of its News Letter the first news release on a significant research project covering the gasification of powdered coal in suspension with oxygen, an investigation which promises a gas-making process employing low-cost fuels.

PULVERISATION and gasification of powdered coal suspended in a stream of air, oxygen and steam at a temperature level sufficiently high to slag the ash in the coal, says the statement, holds promise of a multi-stage, continuous process of high volumetric throughput for the processing of any type of coal. The use of high ash content coal fires—the lowest cost coal available—in a slagging type generator and anticipated decreases in the cost of tonnage oxygen make such a process of great interest to the gas industry. The Gas Production Research Committee of the American Gas Association is sponsoring this study of suspension gasification as a research activity within the Association's P.A.R. Plan.

Volumetric throughput exceeding the highest reported sq. ft. capacities of carburetted water gas sets have already been obtained in the Institute's atmospheric pressure cyclone gasifier. Results have demonstrated the possibilities of producing low cost base or carrier gases for blending purposes of gases of controlled H_2/CO ratio suitable for synthesis to high-B.Th.U. gases and liquid hydrocarbons by the Fischer-Tropsch process.

Flash Pulveriser-Cycloniser

Development of the flash pulveriser-cycloniser process offered an effective and economical method of conditioning coal for suspension gasification. In this process, coarse coal granules are entrained in a stream of compressed gas, the pores of the granules becoming infiltrated by the gas. The coal gas stream is then directed through a nozzle, introducing a substantial pressure drop so rapidly that the gas impregnated granules are ruptured by internal pressure. The resulting suspension of shattered coal in rapidly flowing gas is caused to whirl in the vortex chamber of the cycloniser where the coarser particles are selectively ground by attrition. The addition of preheated air, oxygen or steam to the coal suspension in the cycloniser causes partial devolatilisation and partial combustion of the volatile coal constituents accompanied by a rapid rise in temperature, which combined with the attrition mentioned above produce a very marked reduction of the coal particle size. This added comminution is partially due to softening of the coal with temperature rise and partially due to the rupturing effect of gas evolution. The coal particle size is reduced to 65-85% through a 325 mesh sieve.

It was believed that this marked increase in surface would provide the necessary area for accelerating the gasification reactions and, with the temperature rise of the reactants in the cycloniser, would provide for early ignition and rapid partial combustion in the generator. It was believed that this combination of pulverisation and coal conditioning would permit subsequent gasification at high rates under slagging conditions and would provide a new approach to the gasification of coal in suspension.

It was recognised (1) that the heat released in the partial combustion zone must be great enough to provide a temperature level of 2,400-2,600°F. to maintain a high degree of carbon conversion, a rapid reaction between steam and carbon and a low concentration of carbon dioxide in the make gas; (2) that the rates of diffusion of reactants and products through the minute gas films surrounding each particle would probably be the controlling mechanism at the temperatures employed rather than the rate of chemical reaction; (3) that the unusually small particle size obtained through the unique method of com-

minution employing explosion pulverisation, kinetic energy, devolatilisation and temperature rise produced extraordinarily large surface areas for chemical reaction per unit volume; and (4) that slagging of the ash was feasible and desirable.

Experimental Programme

The initial phase of the experimental programme consisted of remodelling the atmospheric cyclone gasifier to incorporate desired improvements. An 8-in. carborundum tube was installed in the centre of the cyclone reaction chamber, and inlets were installed at both the top and the bottom of the furnace so that firing could be accomplished (1) downward through the tube and upward through the annular space formed by the tube and the reactor walls, (2) downward through the annular space and upward through the tube, or (3) upward through the reaction zone formed by the reactor walls (after removal of the tube).

Progress Report No. 1, submitted to the Gas Production Research Committee in May, 1948, summarised the information obtained from study of the available literature, presented details on the equipment to be used in the project, including the modifications introduced into the design of the cyclone furnace, and discussed the conditions which would be employed in gasification tests from the standpoint of the results of the previous basic research work and the kinetics of the reactions involved.

The next step consisted of calibration of the equipment and initial tests to determine its performance. A measured quantity of gas was burned in the furnace, and the flue gas analysis was compared with the calculated flue gas composition as a check on rates of flow as determined by the metering devices employed. Temperature readings afforded an opportunity to determine the overall heat loss from the furnace walls by conduction and radiation. The initial tests revealed the need for oxygen enrichment of the air to attain partial combustion at the furnace inlet and pointed out several small difficulties in operation which were corrected by minor alterations and additions.

To date, some 70 tests have been made to study the operating variables of the process under a wide range of conditions. Thirteen tests on high volatile Illinois bituminous coal with flow of the suspension downward through the furnace tube and upward through the annular space were reported in November, 1948. The results of 51 tests in which the coal suspension was directed upward through the cyclone furnace after removal of the tube were presented in Progress Report No. 3, April 1, 1949.

These tests have indicated that the primary operating variables are: (1) the ratio of total gaseous oxygen added per unit weight of coal; (2) inlet oxygen concentration of the gasifying medium; (3) ratio of steam to coal; (4) residence time of the gases in the furnace; and (5) temperature. The effects of these variables upon make gas calorific value and composition, per cent. carbon gasified, cold gas thermal efficiency, steam decomposition and coal requirements per 1,000 cu.ft. of make gas have been studied rather completely, the results being presented in Progress Report No. 3.

Gases produced have ranged from high nitrogen producer gas to 270 B.Th.U. blue water gas, depending primarily on oxygen and steam ratios. It has been demonstrated that the hydrogen-carbon monoxide ratio can be controlled by varying the amount of steam added so that gas compositions suitable for synthesis reactions can be obtained. Carbon gasification in excess of 90% of the coal feed has been attained. The cyclone gasifier has been operated successfully at heat releases as high as 352,000 B.Th.U./hr./cu.ft., and is now rated at 500,000 B.Th.U./hr./cu.ft., a level at which the rate of gas production per unit of reactor volume greatly exceeds that attained in standard carburretted water gas practice. The coal ash has slagged easily at the temperature levels employed, and the cyclone furnace has proved an effective ash remover.

To date, the suspension gasification process has required oxygen enrichment of the air stream, the amount varying inversely with the degree of superheat of the steam. Preliminary tests have indicated that the oxygen requirements may be greatly reduced by supplying the steam at higher temperatures or by recycling substantial amounts of make gas to provide heat for the reactions. These possibilities are being further explored.

Encouraged by the results already attained the Gas Production Research Committee has authorised the design of a larger unit to operate at pressures as high as 75 to 90 lb. per sq. in. Preliminary plans for this unit have been completed and will soon be submitted to the Committee for approval. When approved, the unit will be constructed on the premises of the People's Gas Company of Chicago.

DEVELOPMENTS IN U.S.A.

In a recent address, Mr. L. H. East, of the Rochester (N.Y.) Gas and Electric Corporation, referred to the outlook for the manufactured gas industry in U.S.A. Discussing research developments, he mentioned the Hall High B.Th.U. heavy oil process. This process consists of gasifying high carbon residual oils in the checker work of a water gas set and recovering the carbon residue as fuel by blasting the set with regeneratively heated air. This process, the author said, effects a reduction in operating labour by using all liquid fuels, which eliminates the solid fuel generator fire. The process is economical by virtue of using a low grade heavy oil with high efficiency of operation. A plant of this type is in operation in Baltimore, Md., and three other plants are in the drawing-board stage.

Considerable research in connection with catalytic gasification of liquefied petroleum gases, he continued, has been completed. In this process, propane or butane is cracked in the presence of a nickel catalyst in direct fired tube-type furnaces and a gas is produced that is completely interchangeable with coke oven gas, carburetted water gas or natural gas. The first commercial installation was placed in operation in January, 1948, at Riverhead, Long Island. Since that time two additional plants have been installed and placed into operation at Reading and at Harrisburg, Pa.; a third plant is being erected in that State. One of the many advantages of this process, stated Mr. East, is the large capacity at a relatively low investment and labour cost. Another advantage is that effluent water from the gas washer is free from contamination of sulphur, phenols, and oils, so that these catalytic plants can be erected at points on the distribution system where otherwise the disposal of such effluent would constitute quite a problem.

Research work is now being conducted in connection with catalytic gasification of materials other than liquefied petroleum gases as feed stock. These stocks include refinery oil gas, natural gas, gasoline, kerosene, light furnace and diesel oils. The experimental results to date have shown that the straight chain paraffin hydrocarbons in either natural gas or natural gasoline are easily cracked, but that the heavier and more complex hydrocarbons require thermal pretreatment to be used successfully. The three plants in Pennsylvania can use natural gasoline, and additional plants at other locations are now projected.

Under an agreement reached between representatives of the United Kingdom and Brazil, the United Kingdom is to send to Brazil during 1949 metal products to the following values: iron and steel including tinplates, £1.1 mill.; manufactures of non-ferrous metals, £1 mill.; agricultural machinery and implements, £1 mill.; machinery in general, £7.25 mill.; electrical appliances and parts, £1.3 mill.; and cutlery, hardware and implements, £750,000.

Current annual requirements of copper for the United Kingdom are estimated at approximately 375,000 tons in a recently published report by the Metals and Minerals Panel of the Colonial Primary Products Committee. This figure, the report states, is expected to rise to 400,000 tons by 1954. Copper production of Northern Rhodesia in 1953 is expected to amount to 295,000 tons.